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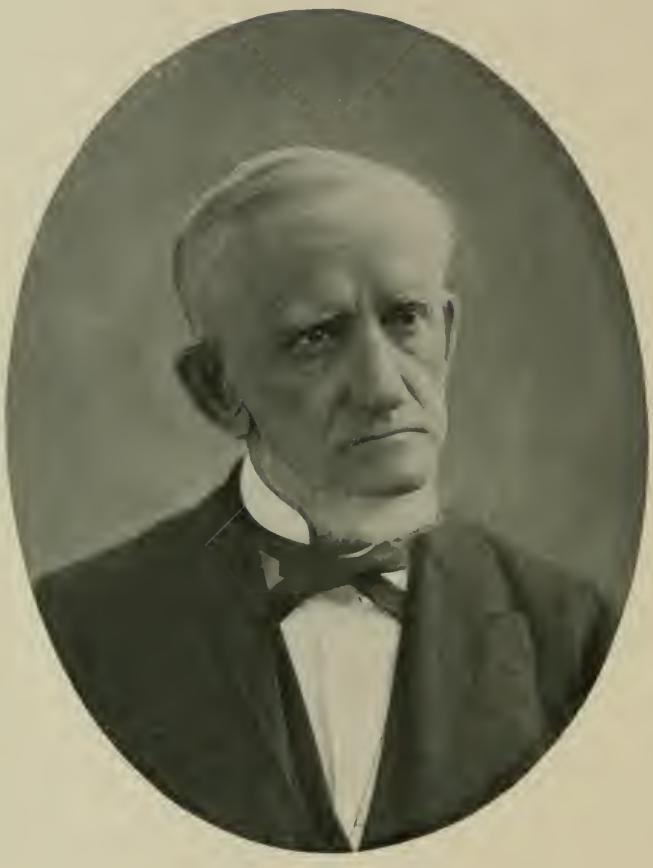

Yours Truly

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HISTORY OF MEDICINE

WITH THE

CODE OF MEDICAL ETHICS

BY

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PREFACE.

From 1892 to 1897, both years included, I gave to the senior class of the Northwestern University Medical School each year a course of fourteen or fifteen lectures on the history of medicine from the earliest periods of which we have any records, to the end of the nineteenth century of the Christian era. My object was to trace with as much clearness and accuracy as possible the origin and progressive development of the various branches of medical science and practice, and their intimate connection with the progress of all other departments of human knowledge.

The following chapters, constituting this book, have been written and revised from the notes used in the lecture room; each chapter representing a lecture in the order in which it was given.

I have consented to their publication in a neat, but inexpensive volume, in the hope that they might attract the attention of a large proportion of both students and practitioners of medicine; and thereby diffuse a better knowledge of the origin, progress, and present status of the true science and art of medicine.

NATHAN S. DAVIS.

HISTORY OF MEDICINE.

CHAPTER I.

THE CONDITION OF MEDICINE PRIOR TO THE TIME OF HIPPOCRATES THE GREAT, 460 B. C.

It was said by Hippocrates that "The physician must know what others have known or he is constantly liable to deceive both himself and others." Consequently, if the physician would know what others have known, he must study, not only the present text-books and literature of the profession, but he must also patiently review its past history from the earliest ages through its successive stages of development and the relations of that development to the progress of man in all other departments of human knowledge.

For every important branch of knowledge bears some relation to every other branch, and in prosecuting our study of the history of medicine, we shall find that in every stage, and in every country, its condition and progress has been intimately connected with the coincident condition and progress in philosophy, religion and science.

The earliest indications of progress in civilization have been traced in Egypt and southern and central western Asia, occupied by the Egyptians, Hindoos, Chinese, Babylonians, Assyrians, Phœnicians, Medes, Persians, Jews and Greeks; and in time extending to 5,000 or 6,000 years before the commencement of the Christian era.

During the 6,000 years just mentioned all these ancient nations, except the Greeks, had been either destroyed, scattered or reduced to a dormant or non-progressive condition, leaving at present, as the chief evidences of their once prosperous and semi-civilized condition, the fragments of broken monuments; the remains of ruined cities, some of them long since buried, but found to con-

tain statues, images, implements and inscriptions; and in Egypt the pyramids with their mummified inhabitants. From all these fragmentary sources of information, sufficient has been gathered to show that all these nations had made much progress in the mechanical arts and mathematics, while their ideas of philosophy and religion were inseparably mixed. Their philosophy consisted in the belief that the world was made of four elements—fire, air, water and earth—all pervaded by spiritual qualities, and the first named most refined, possessed of intelligence, and identical with the soul or spirit of man. Their religion, except that of the Jews, consisted in the recognition and worship of deities almost without number, and generally represented by some material image or statue. Everything pertaining to human life and destiny was thought to be controlled by good or evil spirits, and in consequence a God or Goddess was supposed to rule over every line of blessings and curses or evils that visited them. As a logical necessity, they attributed all forms of sickness, or mental and bodily suffering, to the displeasure of some one of their deities, and of course to such deities they turned with petitions, prayers and sacrifices, for relief.

From the numerous but imperfect data furnished by the researches of antiquarians and historians, it has been inferred that the ancient kingdom of Egypt was founded as early as 6,000 B. C., and its people reached the climax of their progress towards what we call civilization between 4000 B. C. and 3000 B. C., when the most famous pyramid and the noted Sphinx were constructed, during the reign of Chufu or Cheops.

The most ancient and renowned of the medical divinities of that country was Isis, said to have been both sister and wife of Osiris, for it was not uncommon in those days for brothers to marry their own sisters. The divine honors of Isis were founded on the great medical skill she displayed in recalling to life her son Horus. If we may credit this legend it will be perceived that the practice of medicine by the female sex is by no means of modern origin.

Among the other medical divinities were Imhotep, sometimes called the Egyptian Æsculapius, whose temple was at Memphis; Pacht, who was represented with the head of the cat, and was regarded as the special deity of parturient women; and Thout or Taaut, who was sometimes represented with the head of the dog, and was honored as the inventor of the healing art, and of all other arts. To him has been attributed the authorship of the oldest Egyptian medical works, said to have been originally inscribed on pillars of stone. At a later period the inscriptions were copied on papyrus, and made to constitute a part of the so-called sacred "Hermetic Books". According to the medical historian, Baas, the prescriptions in these books were regarded as derived directly from the Gods, and from them no one might deviate without becoming liable to severe penalties. Probably all that now remains of these books may be found in two papyri, one at Leipzig and the other at Berlin. The fact that they contain remedies for the treatment of each part of the body, suggests that the medical men were then as much devoted to specialties as at the present day.

The universal belief that both diseases and their remedies were derived from and controlled by their deities, necessarily caused the office of priest and physician to be united in the same person, and the temples for worship became the chief places of resort for the sick. The most noted of these temples in Egypt were at Thebes, Memphis, and Heliopolis. The names of four physicians, who are represented as practising medicine between 5,000 B. C. and 4,000 B. C., have been preserved and are Teta, Tseshorta, Nebsuchet and Chui. The first two were also kings, and the last was an oculist.

There are indications that considerable progress had been made in the practice of surgery, especially during the reign of the Pharaohs, who were much engaged in war. Their surgeons are credited with having performed amputations, lithotomy, the removal of cataract, the extraction of foreign bodies and the dressing of wounds. Their medical practice consisted largely in conjurations, prayers and

soothsaying, but they sometimes administered both emetics and purgatives.

The ancient Babylonians, Assyrians, Phœnicians, Medes, Persians and Jews occupied the central portion of Western Asia, between the Caspian Sea and the Persian Gulf, and were in their most prosperous condition from 4,000 B. C. to 1,000 B. C. They are supposed to have succeeded a more ancient people called Accadians, or descendants of Accad, and were all of Semitic origin. All these nations had more or less commercial intercourse with the Egyptians, and as far as can be determined by such scanty remnants of their work as have been preserved, their ideas of philosophy, religion and medicine were similar. Like the Egyptians they invented a multiplicity of deities to whom they attributed all the events of life, whether good or evil.

By the Assyrians and Persians the chief God of healing was called Ainyama, and Thrita was the God of physicians.

With the Phœnicians the chief medical deity was Esmun, the eighth of the Cabiri; and as a people they appear to have been more enterprising and intellectually progressive than any of their contemporaries except the Greeks; for the Phœnicians were not only commercially active and given to colonizing, but to them we owe the art of writing with letters, instead of the cuneiform marks of the Assyrians and the hieroglyphics of the Egyptians. To them we also owe the invention of the Zodiac, with its division into signs, degrees and minutes, and the division of the day into twelve equal hours. Their most important temples, both for learning and worship, are said to have been located on the islands, Tyros, Arados and Dilmoun, near the mouth of the Tigris, more than 2,000 years B. C. But almost the only fragment left to indicate anything concerning their progress in medicine is one chapter of the Papyrus Ebers at Leipzig, contributed by a physician of Byblos. The medical historian, Baas represents their supreme deity, called Baal-Zebul (the Beelzebub of the Bible) as a God of Medicine.

The Jews or Hebrews, constituting a distinct division of the Semitic race, are first made known to us as a no-

madic people, inhabiting the country bordering on the middle Euphrates and Tigris called Palestine. At an early period they visited Egypt, but soon returned to Palestine. At a later period, probably not far from 2,000 B. C., they emigrated again into Egypt, where they remained about 400 years, when they were led back to Palestine by Moses (the Egyptian Mesu) between 1,500 B. C. and 1,600 B. C. Their leader and great law-giver, Moses, had been educated in all the learning of Egypt as a member of the royal family, and was consequently familiar with the religion, arts and medicine of that country. But he chose to cast his lot with his own people, and in the Code of Laws he framed for their government he made one important provision differing from the laws of all the other nations of that time. It consisted in the proclamation of one God as the creator and preserver of all things, accompanied by the injunction that Him, and Him only, should the people worship. All other divinities or deities were declared to be false and their worship forbidden under the severest penalties. But he recognized the existence and influence of evil spirits, or demons, the chief of which was Satan, or the Devil. Yet, like the people of all the other countries, the Hebrews regarded the prevalence of diseases, and especially of important epidemics, as punishments inflicted by their Deity on account of their sins. Consequently, for relief, they resorted to repentance, prayer, and the interposition of the priests officiating in their places of worship, rather than to the administration of medicines. They thereby combined the functions of priest and physician in the same persons, even more than did the Egyptians or Assyrians.

While we find a remarkable absence of any mention of either surgical or strictly medical practice among the early Hebrew people, their great lawgiver, Moses, gave them the earliest elementary code of public hygiene of which we have any record. It contained specific directions in regard to the kind and preparation of food; the slaughtering of animals; the burial of the dead; the regulation of marriage and sexual relations; the diagnosis and isolation of cases

of leprosy, and some other contagious or infectious diseases, and the strict prohibition of artificial abortion. The only surgical procedure included was that of circumcision, which was to be performed by the priests of the tribe of Levi. After this people had been repeatedly conquered and compelled to mingle, as captives, with the neighboring nations, they adopted many medical and surgical practices derived from both Egyptians and Assyrians, as may be seen in the book of the Talmud, written during the third century before the Christian era.

Of the condition of medicine among the people originally occupying that part of Asia now called India and China, we really have no knowledge. Max Mueller claims that the progress of the inhabitants of those countries in religion, philosophy and medicine was earlier than in either those of Egypt or Greece. The present inhabitants of India, however, are supposed to have immigrated from the north and settled in Bengal about the year 2000 B. C. According to the traditional mythology of these people, their supreme God of Medicine, called Dhanvantari, was sent to the earth by Indra when the world was sick. He is supposed to have educated many physicians, among whom was Susruta, the son of the fakir-king, Visvamithra and Charaka, and to whom is attributed a remarkable work called the Yayurveda, in which, we are told by Baas, all diseases are divided into "natural and supernatural", and "are ascribed to an unequal or perverted action of the five common elements, ether, air, fire, water and earth. These, however, in the first place, through the influence of food, season, conditions of the atmosphere and the climate, form proximate causes of disease, while corruption of the three elementary fluids, bile, mucus and air, is looked upon as the remote cause".

The Yayurveda of Susruta and the Atharvaveda constitute the medical part of the Vedas or sacred books of India. They are supposed to have originated from 1000 B. C. to 1500 B. C., and are the earliest writings belonging to that country of which we have any positive knowledge.

Max Mueller contends that all the writings constituting the Vedas existed and were transmitted only by oral traditions until the reign of Azoka, 259 B. C. to 222 B. C., or more than a century later than the time of Hippocrates in Greece. The beginning of the book attributed to Charaka-Susruta, now being translated into English, has the form of Aphorisms, of which the following may serve as specimens:

"Mind, Soul and Body, this trinity, called person, resteth on union like three sticks (standing against each other). Upon that trinity everything rests".

"Of all diseases, physical and mental, the causes in brief are of three kinds, viz: Adverse or excessive correlation, or want of correlation of time, mind, and the objects of the senses".

"Body and mind are regarded as the subjects in which health and disease co-inhere; parity of correlation being the cause of health".

"The Soul is immutable and eternal; faculties, the attributes of matter, and the senses, are the causes of consciousness. The Soul is the eternal witness, for it views all actions, without being itself affected by any of them".

"Wind, bile and phlegm have been said to be the causes of all bodily diseases. The qualities of passion and darkness have again been indicated to be the causes of mental diseases". (See translation of Charaka-Samhita, published by Abinash Chandra Kaviratua.)

Baas says that the oldest of the Veda books called the Rigveda, contains simple charms, of which he quotes the following:

"Ye breezes, healing blow, and waft his pain away;
The Gods have sent you forth with stores of healing drugs."

Again:

"Healing are the watery billows, water cools the fever's glow;
Healing against every plague, health to thee brings water's flow."

The last two lines may be taken as forestalling our modern hydrotherapy or bath treatment of fevers.

The general adoption of the religious doctrines of Brahma, with its division of the people in castes, and the complete rule of the priests about 800 B. C., seems to have arrested all further progress in either medicine or general science.

The introduction of the Buddhistic doctrines four centuries later, and considerable commercial intercourse with Greece, evidently caused some modifications; but, notwithstanding these, the native people of both India and China have remained in a remarkably non-progressive condition for the last 4,000 years.

The Chinese are even more fanciful than the Hindoos, and yet more fatalistic in both religion and medicine than the followers of Mahomet. They appear to attribute all diseases of an epidemic character to the influence of spirits, aided by cold or warm winds. In their pharmacology, as compiled by Lee-Sheo-Tshin, are included "elephants' bile, dried spiders, bugs, toads, lizards, snakes, claws, ears, tongues, hearts and livers of numerous animals, excrement, dragon-bone, cotton, ivory, musk, rheubarb, gentian, camphor, etc." (Baas.) A summary of their ideas of anatomy and physiology as given by Baas, is as follows: "The Chinese assume the existence of six chief organs in which the 'moisture' is located, viz: The heart, liver, two kidneys, spleen and lungs; six others in which is the seat of 'warmth,' viz: The small and large intestine, the gall-bladder, the stomach and the urinary apparatus. They enumerate 365 bones, including 8 for the male and 6 for the female cranium; 12 ribs in men and 14 in women". Instead of the fire and earth of the other contemporary nations, the Chinese regard wood and metal as elements, and heat and moisture as fundamental qualities.

Did our time permit, traces of the same theurgic ideas and practices in relation to medical matters could be found among all the other ancient inhabitants of Asia, Africa, the islands of the Pacific and of the Indian oceans, as well

as among all the aboriginal tribes and nations of North and South America.

Everywhere, in the early ages, diseases were attributed to supernatural agencies, as either the work of demons or evil spirits, or inflictions of the Gods as punishments for the sins of the people; and as a consequence the priests were the chief physicians. Indeed it might be said that their medicine was only a part of their religion; and whether they worshipped one deity or many, they all persistently claimed that the human body, dead, was more sacred than while living, and that the study of human anatomy by dissections was sacrilege. In consequence of that doctrine and the absence of a knowledge of analytical chemistry, the science and art of medicine remained substantially stationary during all the past seven or eight thousand years among all the early or aboriginal inhabitants of Asia, Africa and North and South America. And it is to be regretted that we still have some among us who, notwithstanding all our progress in science, philosophy and art, still regard medicine as a part of their religion, and consequently when sick they call for prayers instead of physic—the priest instead of the physician. Such people appear to be incapable of comprehending the fact that the God they worship—the Creator of the universe—himself works with materials and in accordance with laws, and that the true office of prayer is for His guidance in the choice of materials and for wisdom in their application.

The earliest traces of medical history in Europe have been found among the ruins of the buried cities, the broken monuments and works of art, and the historical poems of Homer, belonging to the people called Hellenes of ancient Greece. They unmistakably point to a period of time coincident with the period of greatest prosperity in Egypt, Assyria and Phœnicia, i. e., from 6000 B. C. to 1000 B. C.

And the Hellenes, or Greeks, like their contemporaries in Egypt, assumed the existence of numerous deities, both male and female, or Gods and Goddesses, to whom they attributed the control of nearly all the affairs of life. Chief among these were Apollo, Pluto, Hercules, Juno,

Artemis and Coronis. According to Homeric mythology, Apollo was the ruler of Pestilence; Artemis, the Goddess of Parturition; Pluto, the ruler of Hades; and Hercules was the discoverer of warm baths. The special God of Medicine, however, was Æsculapius, the mythical son of Apollo and Coronis.

Another fable represents him as having immigrated from Memphis in Egypt, and to have received instruction in the healing art by Chiron, who is represented in Greek art as half horse and half man. The very great skill acquired by Æsculapius in restoring the sick to health, is said to have so offended Pluto, the keeper of Hades, that he induced Zeus to slay him with a thunderbolt.

By some writers Æsculapius is represented to have been a real person, living about 1250 B. C., who after death was deified, and the temples erected by his followers, both for the reception of the sick and for worship, were called Æsclepieia, and those who administered in them were called Æsclepiadæ, on whom devolved the double duties of physician and priest. These temples or Æsclepieia were established at Tricca, Epidaurus, Rhodes, Cos, Cnidos, Pergamos, and other places; but those most celebrated were at Cos, Cnidos and Rhodes. The historian, Herodotus, very properly calls Homer the Manufacturer of Gods; yet in the poems of Homer, Æsculapius is represented only as a physician of extraordinary skill and the father of Machaon and Podalirius who were the chief army surgeons as well as warriors in the Hellenic wars described by the poet. He also alludes to female physicians, especially to Hellen and Agamede, "who all healing herbs well knew." And Pæon is called the divine healer of wounded Gods, as in the following:

"Thus he who shakes Olympus with his nod,
Then gave to Pæon's care the bleeding God.
(Ares.)
With gentle hand the balm he poured around,
And healed the immortal flesh and closed the wound."

The medicine of the Greeks prior to, and during, the Homeric period was mostly surgical. He makes very lit-

tle allusion to internal diseases, once only alluding to an epidemic of nine days produced by the darts of Apollo, and to a pestilence in Crete during the siege of Troy. The Homeric period proper is supposed to have been the 9th century B. C. Up to that period and for three centuries later, they had no written language, all knowledge being acquired and transmitted by oral instruction from one generation to another. The earliest writing found in Greece was on small pieces of leather executed about 600 B. C., and inscriptions on tablets in the Æsclepieia.

It was not until the introduction of papyrus from Egypt and the art of writing with letters from Phœnicia that a real literature was commenced in Greece. Hippocrates, about 450 B. C., is represented to have been the first physician to commit his views concerning diseases and their treatment to writing; and is therefore justly styled the "father of medical literature", as well as the father of medicine.

While the Greeks, like the other primitive nations, attributed all things to the control of invisible spirits, good or evil; and regarded the world as composed of the four elements, fire, air, water, and earth, they displayed a far greater intellectual activity in studying the relation of these elements to physical changes constantly taking place under their observation. This early gave rise to the evolution of theories or so-called schools of philosophy. The earliest of these schools of which we have any account, called the Ionic, was founded by Thales, of Miletus, a pupil of the Egyptian priests, about 600 B. C. He assumed that reason, spirit or mind and God were one; and that water and spirit were the first cause of all things, and preserved their identity throughout all the changes in what he called secondary elements—fire, air and earth. Half a century later, Heraclitus, of Ephesus, taught that fire instead of water was the primal matter, and enmity between the particles of matter was the cause of decay, and friendship the cause of their union in all the visible forms of matter. He also regarded the embryo in impregnation to be derived

wholly from the male semen, and the uterus as the receptacle for its development.

Anaxagoras, of Clasomena, in Asia Minor, about 460 B. C., said to have been the teacher of Pericles, in addition to some very advanced views in astronomy, taught that matter and spirit were "the elementary principles of the world"; the first being composed of innumerable atoms which were moulded or transformed by the active creative spirit, into all bodies animate and inanimate. He represented that the animal body was nourished by appropriating to itself materials similar to those of which it was constituted; and that diseases were caused by the penetration of bile into the blood vessels, lungs, and pleura. About the same time Empedocles, of Agrigentum, while admitting that fire, air, water and earth were the elements of all things, claimed that no element could be destroyed; that all changes in bodies were only changes in the arrangement of elements or atoms, and that all bodies were formed by the friendship (attraction) and destroyed by the enmity (repulsion) of the elements entering into their composition. His medical views are set forth by Baas as follows: "The sex in the embryo was determined by the predominance of heat or cold in the parents". He believed the embryo was nourished through the navel, and to him we owe the terms amnion and chorion. Death, however, resulted from the extinction of heat, the effect of the separation of the elements. Expiration arose from motion of blood upwards, and consequently of the air upwards; inspiration in an inverse way.

Although he referred the cure of diseases to the Gods, nevertheless it is said that he endeavored to banish epidemics by building bonfires and draining swamps, without waiting for his divinities to act; more rational, certainly, than some at the present day.

Another coincident, and perhaps more influential school was that of Pythagoras, of Samos, established about 550 B. C., and sometimes called the Italian School. Pythagoras visited Egypt where he became acquainted with the mathematics and other branches of Egyptian learning, and

for a time was a pupil of Onuphis, of Heliopolis. He attempted to build a theory of the universe founded on numbers. Unity, or monad, was the beginning of all things, the symbol of perfection, the Anima Mundi, or God. Duad, or number 2, represented the material world. Visible bodies are formed by combinations of an endless variety of numbers one and two or the monad and the duad. He taught that the Anima Mundi, or God, was the light of the universe and self-created. That the Anima, or mind or soul of man, was an emanation from God and immortal, while his body after death underwent decay, and that the basis of life was heat. Physiologically, he represented new animal life as originating from the semen, a fluid emanating from the brain. A proper regulation of diet and exercise was regarded as necessary for the promotion of health. The application of salves and poultices was recommended, but surgical operations were discouraged. As diseases were attributed to demons or evil spirits their cure was sought by prayer, sacrifices and music.

He endeavored to form his followers into a club under a pledge to observe certain rules of living.

Alcmæon, of Crotona, a pupil of Pythagoras, was one of the earliest to study comparative anatomy by the systematic dissection of animals. To him is attributed the discovery of the optic nerves and Eustachian tubes; and he explained hearing by claiming that the ear contained a vacuum in which the sounds were produced. When Polycrates banished the Pythagorians from Crotona, many of them became itinerant physicians, and were perhaps the first to visit patients at their homes.

The Materialistic school, founded chiefly by Democritus, of Abdera, about 450 B. C., also exerted considerable influence on the development of medical ideas. The distinctive features of the philosophy of this Sect, or School, were: 1st. The denial of all Anima, Spirit, or God, and substituting therefore Necessity, or Fate. 2d. The declaration that all things originate in matter composed of infinitely minute and numerous atoms, in which inhere order, position, form and motion. The atoms differ in size and

weight in consequence of which their combination produce the four elements, fire, air, water and earth. The functions of sensibility and mental phenomena were attributed to very small, round, smooth atoms in motion. These were supposed to be particularly active in the heart, causing anger; in the liver, desires; and in the brain, thought. It was claimed that a healthy brain produced mental health, and a diseased brain mental disorder; thereby anticipating by more than 2,000 years some of the cerebral and mental pathology of the present day.

Besides the foregoing schools of so-called Philosophy and Medicine, there were also the Sophists, founded by Gorgius, of Loentium; the Socratists, founded by Socrates, perhaps the greatest of Grecian philosophers and the strongest opponent of the materialistic doctrines of Democritus; and the schools more directly connected with the Æsclepieia, or temples of Æsculapius, to which the greater number resorted for treatment, and which were the chief repositories of the tablets on which were inscribed many facts relating to cases of disease and their remedies.

I have thus far endeavored to give a brief statement of the condition of learning among all the peoples or nations of which we have any authentic records prior to the advent of Hippocrates, about the middle of the fifth century before the Christian era.

We have seen that among them all the real progress in development was limited to the mechanical arts and mathematics. The construction of implements, houses, cities, images, pictures, statues and monuments was carried to a high degree of perfection; and in the science of numbers they showed no lack of proficiency. But without any analytical chemistry, anatomy or biology, they had no means of determining the composition and properties of the visible bodies around them, nor of the composition and functions of the structures and organs of which their own bodies were composed. Hence, their only conclusion was that the four visible and tangible forms of matter: fire, air, water and earth, were the real elementary materials of which the world was made; and

that the four visible fluids coming from a living animal body: blood, phlegm, bile and black bile, were the elementary humors which, when natural, constituted health, and when disordered, constituted disease. But the mysterious evidences of design and incomprehensible wisdom displayed in every department of nature led them instinctively or intuitively to refer the authorship of the whole to invisible spirits or Gods. And having accepted the existence and power of spirits or Gods, what more logical than to attribute the good things to good spirits, and the bad things to evil spirits. Equally logical and necessary was the next step, to attribute all diseases either to the evil spirits or demons, or as punishments by the good spirits on account of the sins of the afflicted. And if the diseases were inflicted by the Gods, good or evil, of course the chief remedy must consist in prayers, sacrifices and penances for propitiating the offended deities, and for this the priest becomes the physician. Thus, we have, in a few words, the actual development of medicine and its relation to other departments of human knowledge from the beginning of man to the days of Hippocrates.

CHAPTER II.

HISTORY OF HIPPOCRATES,—HIS WRITINGS, AND THE PROGRESS OF MEDICINE DURING THE FIVE SUCCEEDING CENTURIES, OR TO THE TIME OF GALEN, 150 A. D.

The preceding chapter had brought our history of medicine to the middle of the fifth century B. C., a period when Grecian civilization and power had reached their zenith. Greece had victoriously closed her wars with Persia, and in statesmanship, in works of art, in history, in schools of philosophy, and in physical culture, she had excelled all her contemporaries. The art of writing had been introduced from Phœnicia, and the use of papyrus from Egypt, thereby greatly facilitating the recording of facts and the history of events of every kind. It was at this auspicious period in human progress that Hippocrates, called the Great, appeared in Greece. He was born in the Æsculapian Temple, on the Island of Cos, about 460 B. C. His father, Heraclides, belonged to the order Æsclepiadæ, and is represented to have been the seventeenth in order of descent from Æsculapius. His mother, Phœnarete, was a midwife, eighteenth in descent from Hercules.

Hippocrates received his early education under his parents in the Temple, but after their death he went to Athens and made himself familiar with the doctrines of the Sophists under Gorgias, as well as those of Pythagoras and Democritus and their antagonist, Socrates. Thus educated in the best schools of Greece, and thoroughly acquainted with whatever records relating to medical topics had accumulated in the Æsclepion at Cos, which was one of the most celebrated then in existence, he commenced his professional career contemporaneous with the statesmen Themistocles, Miltiades, Pericles and Nicias; the philosophers, Anaxagoras, Pythagoras, Democritus, Socrates and Plato; the dramatists, Æschylus, Sophocles and Euri-

pides; the orators Lysias, Æschines and Demosthenes; and the historians Thucydides, Herodotus and Zenophon.

Although, at the time of Hippocrates, the Greeks had reached the climax of their civilization, their medical attainments and practice were still limited mostly to the Æsculapian Temples with their Æsclepiadæ, and the few surgeons attached to their armies and gymnasiums or training schools for the athlete.

But the fact that Hippocrates, after having been born and educated in one of the Temples, had visited other cities and studied thoroughly the doctrines of the leading schools of philosophy, had prepared him for a wider range of mental vision, and a more independent application of the faculties of observation and reason with which he appears to have been richly endowed. Consequently we find him early separating himself from the order of Æsclepiadæ,in which he had been born, and engaging in the work of a general practitioner of medicine. As such he visited and practised in the provinces of Thessaly, Macedonia and Scythia, and everywhere studied with great care the actual phenomena of diseases and their causes. After spending several years in this somewhat itinerant mode of practice, during which he gained a very high reputation for probity. learning and skill he settled at Larissa, in Thessaly, where he continued to practice his profession until his death, about 377 B. C. This would make the duration of his life about eighty-three years. (I use the word of indefinite meaning, about, advisedly, for the reason that neither historians nor antiquarians have been able to determine positively either the year of Hippocrates' birth or death.) His professional services were solicited by all classes of the people, including municipal authorities and kings. His reputation is said to have been greatly increased by his successful treatment of the wife of the philosopher, Gorgias; by the great and destructive "plague" that prevailed at Athens between 430 B. C. and 425 B. C.; and the cure of Perdicas, king of Macedonia, who was sorely afflicted with "lovesickness." It is said that he was offered a large sum of money by the Persian king Artaxerxes, to induce him to

become the chief medical advisor of the king and his army. But he patriotically refused to bestow his professional services on the enemies of his own country.

Hippocrates was a patient and accurate observer and industrious writer. He wrote on papyrus and in the Ionic dialect. The number of books or essays bearing his name have been stated by different writers as forty-two, fifty-three and seventy-two. Many of them, however, were doubtless by other physicians of the same name, of whom there were no less than five later in the same family line, and some of them are plainly fraudulent. Only nine have been unanimously considered genuine works of Hippocrates the Great. The most important of these are the Aphorisms; the treatise on Air, Water and Locality; and the Essays on Prognostics, Epidemics and Diet; all of which have been preserved by translation and republication in the modern languages of Europe, including the English.

One of his characteristic precepts is worthy of the attention of every practitioner of medicine, and I quote it as follows:

"Life is short, opportunity fleeting, judgment difficult, treatment easy, thought hard; but treatment after thought is proper and profitable".

Equally worthy of remembrance are the following maxims: "The physician is a servant, not a teacher of nature". "Follow nature". "The physician should benefit, or at least not injure". Yet he declares that, "Timidity indicates incapacity, rashness want of skill". All these precepts clearly point towards the three great distinguishing mental qualities of Hippocrates, namely, patient observation, logical reasoning and faithful recording of both facts and deductions. It was by the diligent exercise of these noble qualities that he was enabled to commence an absolutely new era in medicine, and to leave a literature containing facts, deductions, and practical maxims that are still, after the lapse of more than 2,000 years, worthy of our careful study.

Like both his predecessors and contemporaries, he was

obliged to accept as cardinal doctrines the assumptions that fire, air, water and earth were the real elementary forms of matter of which the world was constituted; that the fire was the most refined, possessed of intelligence and identical with the spirit or soul of man; and that the four fluids, blood, phlegm, bile and black bile, were the cardinal humors of the living body.

Unlike them, however, instead of referring all diseases to the influence of good or evil spirit—gods or goddesses—he concentrated his attention on the patient study of the local causes, symptoms, progress, and terminations of diseases, and made the best possible use of the four supposed elements and four fluids to explain the morbid processes as they were presented for his study.

From such study he soon assumed as a fundamental proposition that health consisted in the uniform action and reaction of all these elements upon and between themselves; and that disease was an irregular, or non-uniform, action and reaction of the same elements.

He further assumed that heat was the most essential condition of life, and that its loss was the cause of death. (This assumption was revived and made the corner-stone of the Thomsonion School of Medicine, originating in the New England States during the first half of the 19th century.) He also supposes that the pneuma, or air, circulating in the vessels to be a second force essential to the continuance of life, and that its irregular circulation is a cause of disease. These two forces, heat and pneuma, or air, inherent in the living body and acting in conjunction with the other elements, appear to constitute the vis vitæ, or the Nature on which Hippocrates so much depends for the prevention and cure of disease. By strictly clinical observation he learned that these forces, constituting Nature, were sufficient under favorable circumstances to effect the cure of a large proportion of the cases of disease. By the same observations he learned that all acute diseases, especially, progressed through a succession of three stages in regular order and within limited periods of time. These stages he designated as of crudity, concoction and cri-

sis; the first corresponding with our prodrome or forming stage; the second with our stage of active development; and the third with our stage of decline. And as he saw in most cases, at the crisis marking the commencement of decline, notable evacuations either from the skin, kidneys or bowels, these were regarded as the morbid products of the concoction of fluids or humors during the second stage. If they failed to appear at the usual period it was regarded as an unfavorable index or prognosis.

Having thus determined by careful clinical observation, that all acute diseases inherently tend to pass through the three stages named, within a limited period of time; and when they do so with regularity to end in recovery, he logically inferred that the chief object of treatment was to aid the natural processes. Hence his maxims, already quoted, to "follow Nature", and that the physician is the servant or pupil and not the teacher of nature. By true inductive reasoning, when in the stage of concoction, or what we call the stage of active advancement, the heat became too intense, he endeavored to lessen the excess of heat by cooling drinks, bathing, and sometimes venesection, and a restricted diet; and as the stage of crisis approached he sought to aid in casting out the products of concoction by such evacuants as diuretics, diaphoretics, cathartics and sometimes emetics.

It was by such long-continued observation, and the practice of as rigid a system of inductive reasoning as any advocated by Bacon 2,000 years later, that Hippocrates was enabled to deduce those practical maxims in regard to the natural stages of diseases, and the therapeutic indications afforded by them, and to record the same in his works under the head of Aphorisms, Prognostics, etc., and which are still accepted as established truths in therapeutics.

Instead of following the example of all his predecessors, by referring the causes of disease to supernatural agencies, he studied with the same diligence and mental acumen the influence of local conditions in producing disease, as is shown in his work on "Air, Water and Locality", and on "Epidemics", and still more in his work on "Dietetics" in

which he discusses the influence of modes of living and diet in both sickness and health.

The writings of Hippocrates show that he was a general practitioner, not restricting his practice to one or two departments of the healing art.

His surgical practice was not extensive. He describes some dislocations and fractures, the operations of trephining and paracentesis of both chest and abdomen, and the suppression of hæmorrhage by cold applications, compresses and bandages. But he remarks that, "he who desires to practice surgery must go to war".

His very limited knowledge of anatomy and physiology led him to express many opinions that would appear very ludicrous at the present time. For instance, he makes no distinction between vessels, nerves and tendons, but regards the two last as carrying air, or pneuma. He speaks of the food as "cooked in the stomach aided by heat furnished by the liver". The brain he describes as a secreting organ condensing into mucus, or phlegm, the ascending vapors of the body and discharging it through the nose. And he ascribes most of the diseases of the eyes to the descent of bad humors into them from the brain.

Perhaps the best English translation of the writings of Hippocrates is by Adams in two volumes published in London, 1849.

The great benefits bestowed upon the development and progress of medicine by Hippocrates were threefold. 1st. He effectually severed the practice of medicine from subserviency to the priesthood, and gave it an independent professional standing. 2d. He boldly substituted a thoroughly clinical study of the actual symptoms, progress and results of diseases and their causes, and an example of strictly inductive reasoning, for the purely fanciful or metaphysical methods of all his predecessors. 3d. By a faithful record of the results of all his studies in such language as by ready translation and perpetuation became the actual beginning of a permanent medical literature. And surely these are sufficient to justify his being called "The Father of Rational Medicine".

Notwithstanding the very high reputation gained by Hippocrates during his life, he left no pupils or followers imbued with the same spirit of investigation as himself. His two sons, one called Thessalus and the other Draco, were both physicians; the first lived and practised at the court of Archelaus, King of Macedonia, and the second was physician to Queen Roxana. His son-in-law, Polybus, is credited with some investigations regarding the origin and office of the membrane surrounding the egg, and with the authorship of some of the books ascribed to Hippocrates. But neither of them added anything to the progress of medicine.

The individual who exerted the most influence directly following Hippocrates from 400 B. C. to 347 B. C., was Plato, who instead of following the rational methods of the former, endeavored to evolve from a mixture of the philosophical doctrines of Pythagoras and Socrates a dogmatic system of both philosophy and medicine as fanciful as any that preceded, though clothed in language well calculated to captivate his pupils. Having resided several years at Heliopolis, he became familiar with Egyptian mathematics.

One may judge of the value, or rather the non-value, of his philosophy by the following: "Absolute intelligence, or God and Matter, constitute the universe. The world is formed of the four elements which are not indivisible, but composed of atoms; those of fire being pyramidal, those of earth cubical, those of air octagonal, and those of water twenty-sided" (Baas).

His medical doctrines were of the same dogmatic fancies. Thus he teaches that continued fever is caused by fire; quotidian by air; tertian by water; and quartan by earth. Of course medicine derived no real aid from him or his immediate followers.

Praxagoras, of Cos, during the latter part of the third century B. C., is credited with having discovered the difference between arteries and veins, the latter always carrying blood, while the former he said carried air except when wounded so as to allow the air to escape. Then they be-

came filled with blood absorbed from adjacent parts. He also studied the variations of the pulse in health and disease.

The most influential man in both philosophy and medicine during the third century B. C. was Aristotle, the teacher of Alexander the Great, and the founder of the natural sciences, especially botany, zoology and comparative anatomy. Being the intimate friend and adviser of the Emperor Alexander, who had established his capital or chief city at Alexandria in Egypt, he received from him all the aid he needed for making botanical and zoological collections, and prosecuting the dissection of animals. The proceeds of his labor and that of his pupils, were accumulated at Alexandria and paved the way for the establishment of the great Alexandrian University with its renowned library and museum.

Although by the actual dissection of animals Aristotle added many items to the previous knowledge of anatomy and actually remained the chief authority in that department for eight or ten centuries, his descriptions were very imperfect, and his physiological views fanciful. For instance, with reasonable correctness he describes the brain as composed of two lobes and the cerebellum with the ventricles, but fails to distinguish between nerves and tendons, and thinks both are derived from the heart. He clearly recognized four general functions of the living animal body, i. e., the nutritive, the sensitive, the motive and the intellectual. The three first he regarded as common to all the structures. The fourth, intellect, he limits to a special seat, but leaves us in some doubt whether he thought that seat was the brain or the heart.

Alexander, who, with his victorious army, had subdued all Greece, Egypt, and nearly all of the southwestern part of Asia, founded near the mouth of the Nile the city of Alexandria as the capital of his vast empire, and with the aid of Aristotle and Plato had also made it the chief center of learning, died at the early age of thirty-three. Directly after his death the empire was divided between two or three of his most successful generals. The King-

dom of Egypt with its new capital city came under the rule of Ptolemy Sotor, who was followed in succession by Ptolemy Philadelphus and Ptolemy Euergetes, covering a period of 100 years, or from 323 B. C. to 222 B. C. All these followed the example of Alexander in extending the most liberal aid to those engaged in cultivating science, literature and the arts, and succeeded in elevating Alexandria to the zenith of its greatness, as the emporium of commerce, literature, science and art. During their reign their Greco-Egyptian Kingdom was supposed to contain 30,000 towns and more than 7,000,000 of inhabitants. It is claimed that the great library contained 700,000 volumes, which means that number of rolls of papyrus, a dozen of which might not contain as many words as one of our octavo volumes of 250 printed pages. The museum contained a proportionately vast collection of works of art and specimens of natural history, particularly in botany, zoology and comparative anatomy, to which was added at least one human skeleton. The great library and museum constituted the basis of the Alexandrian University, which attracted not only students of every kind, but also the learned in all departments of human knowledge from all the surrounding countries. It is well to remember, however, that it was to the philosopher and physician, Aristotle, that Alexander owed the accomplishment of the greater part of his literary and scientific works; and that the Ptolemies were equally indebted to the physicians Herophilus and Erasistratus and their disciples.

Herophilus was born in Chalcedon about 335 B. C., became a pupil of Praxagoras, of Cos, from whom he imbibed an earnest desire to prosecute the study of human anatomy, and was the ordinary physician to Ptolemy Sotor when he succeeded Alexander as King of Egypt. Notwithstanding the universal prejudice and extreme penalties against all efforts to dissect the human body, Herophilus obtained the King's permission to secretly dissect the body of one or more criminals after death. It was doubtless from this source the complete human skeleton came into the Alexandrian Museum, and which remained

for several centuries one of the chief attractions for students and practitioners of medicine. By the opportunity thus afforded he gained a much better knowledge of the different parts of the body, describing with considerable accuracy the brain and nerves and the connection of the latter with the former, and also their sensory and motor functions. He described the pulmonary artery and vein; the lymphatic and chyliferous vessels; together with most of the viscera of the abdomen. In diagnosis, prognosis and treatment of diseases he followed Hippocrates more closely than any of his contemporaries.

Erasistratus, of Iulis, who followed Herophilus only twenty-three years later, was a pupil of Chrysippus, of Cnidos, and of Theophrastus, and soon became the ordinary physician of King Seleucus. Antiochus, the son of Seleucus, had been sick through ardent love for his stepmother. Erasistratus correctly diagnosed his case by taking notice of his palpitation, trembling and blushing on the approach of the lady, and cured him by prescribing their marriage. For this he gained not only a high reputation for skill in diagnosis, but also a large fee, said to have been one hundred talents. Subsequently, he resided in Alexandria where he became the physician and companion of Ptolemy Philadelphus as Herophilus had been of Ptolemy Sotor.

Pergamos was the capital city of another Kingdom, resulting from the division of the Empire of Alexander, and the seat of a noted Æsclepion. For many years she maintained an active rivalry with Alexandria, especially as a seat of learning and possessed of a library of many thousand volumes founded by Eumenes II, about 170 B. C. On account of this rivalry the second Ptolemy thought to cripple the work at Pergamos by prohibiting the exportation of papyrus from Egypt. But that only resulted in the discovery and use of parchment instead of papyrus at Pergamos.

Mithridates, both king and physician, established extensive botanical gardens at Pergamos and cultivated many medicinal and poisonous plants with which he experi-

mented both on himself and others for the purpose of discovering an antidote that by use would render him immune to all poisons; for he, like many of the rulers or kings of that period, lived in constant fear of being poisoned by his enemies. The so-called antidote formed by him, contained a large number of ingredients, and under the name "Mythridaticum", retained a high reputation through many centuries.

Aside from the works of Aristotle, Herophilus and Erasistratus, real medicine made very little progress in the great Alexandrian School until the city and the whole Greco-Egyptian kingdom fell a prey to the victorious Roman armies under Tertullus and Pompey. Until the time of this conquest the Romans had made very little progress in any department of the healing art. What rudimentary efforts were made in the practice of either medicine or surgery were confined mostly to their slaves and consequently medicine was in bad social repute. But in accordance with the practice of all the conquerors of their time, the Roman legions took as legitimate booty all the movable works of art and other treasures from the conquered countries to Rome. In doing this, they also took many Greeks for servants, and among them some who proved much more skilful in medicine and midwifery than any of their own countrymen. Not only this, but as soon as it became manifest that the future metropolis of learning, as well as of commerce, was to be Rome instead of Alexandria, the most learned in art, philosophy and medicine began to migrate thither from all the other countries, as they had previously been doing to the Alexandrian University. By such transference, in a comparatively brief period of time, the Greek culture had made as complete a conquest of the Roman, as the Roman armies had those of Greece.

The earliest physician to gain renown in Rome was Asclepiades, born in Prusa in Bithynia, 128 B. C. He was educated at Alexandria, and of course was familiar with the schools of philosophy that had flourished in Greece. He spent a few years practicing medicine in Athens, Pro-

pontis and on the Hellespont, and then went to Rome. At Rome he first taught rhetoric, but soon resumed the practice of medicine and by his superior mental endowments, coupled with an abundance of self-assurance, he became the personal friend of Cicero, Crassus and other influential Romans, and gained a very high reputation.

His reputation was caused more by the vehemence of his denunciation of Hippocrates and the advocates of the humoral doctrines founded on the four humors, than by anything that he added to the general stock of medical knowledge. For his own doctrines were only slight modifications of those of Heraclides, Democritus and Epicurus, relating to atoms, promulgated three or four centuries earlier. He regarded all bodies as composed of very numerous and minute atoms between which were empty spaces or pores. "If the motion of these particles is quiet and regular it is called health, but if it is irregular, feeble or boisterous, sickness arises. Sickness also originates in the air received in respiration, and in the food, and enters our bodies in respiration and digestion, by both of which it passes through the pores into the heart and the blood, and through this finally into the whole body which it nourishes. The pulse originates in an influx of the particles into the vessels; animal heat, sensation, secretion, in a similar way; hunger and thirst, however, originate in emptiness of the pores of the stomach, which, in accordance with our varying conditions, may be either full, empty or contracted".—(Baas.)

Such were the anatomico-physiological ideas of Asclepiades, the founder of the Roman Medico-Philosophical school called Methodists, or Solidists, which constituted the first serious opposition to the humoral doctrines of all the preceding ages. He gained some surgical reputation by performing tracheotomy for the relief of severe cases of angina. In the general treatment of disease he was conservative, relying much on the regulation of diet, cooling drinks, frequent bathing and friction or massage, but he sometimes resorted to enemas, cathartics, emetics, and blood-letting.

Among the most prominent disciples of Asclepiades was Themison, of Laodicea, 50 B. C. The distinctive feature of his teaching was not that the body was made of atoms and pores simply, but that the pores were capable of expanding and contracting; and he attributed all diseases to a want of harmony between the size of the atoms and pores. Hence he arranged all diseases into three classes: 1st. Those that caused too great relaxation of the pores, called Laxta; 2d. Those caused by constriction of pores, called Stricta; and 3d. Those with some pores relaxed and others contracted, called Mixta.

A much more important practitioner and contributor to medical literature was Soranus, of Ephesus, who practised in Rome during the times of Trajan and Hadrian from 98 A. D. to 138 A. D. He wrote very creditable works on medicine, surgery, midwifery, diseases of women, and on the etymology of the names of the different parts of the human body. His work on midwifery was for the instruction of midwifes, translations of which have been preserved, and show that practical obstetrics was at that time relatively better understood than any other branch of medicine. He wrote in the Greek language, but several of his works were subsequently translated into the Latin.

Aulus Cornelius Celsus, from 25 B. C. to 45 A. D., was another important Roman medical writer of high authority. He wrote in the Latin language, and in a style so pure and elegant that he has been called the Cicero of medicine. He also wrote works on philosophy, oratory, jurisprudence and history. His medical writings are not so valuable for the original matter they contain, as for their full summary of the views of the best authors during the later Greek and Alexandrian periods, which would have been otherwise lost.

Soon after Celsus and Soranus, the disciples of the school of Methodism became divided into several minor schools, of which only the Pneumatic and Eclectic are worthy of mention. The most important feature of the doctrines of the Pneumatic school, was the engrafting of the pneuma,

or world-soul of Zeno, upon the naked Solidism of the Methodists; and its most prominent supporter was Athenæus, of Attalia, in Cilicia.

The founder of the Eclectic school was Agathinus, of Sparta, about 90 A. D. His cardinal principle was to avoid theories and metaphysical speculations, and to select from all the preceding schools or teachings, that which was most reasonable and practically beneficial. Among his influential followers were Archigenes of Apamea; Aretæus, of Cappadocia; Herodotus; Philip, of Cæsarea; and more important than all the others Claudius Galen, of Pergamos, during the last half of the second century, A. D.

It has already been stated that prior to the conquest of Greece the Romans had no medicine worthy of the name, and that the few who made some efforts to practise belonged to a class of servants or slaves, but we have seen that in Greece, Egypt and the countries of Asia, their practice of medicine was so closely connected with their religion, that its practitioners were directly affiliated with priests, kings and even deities, and consequently they occupied a very high social position. At first, the introduction of Greek medical practice into Rome was met with bitter opposition and scorn. But when Asclepiades had gained the personal friendship of Cicero and accompanied Cæsar in one of his campaigns where he had an opportunity to show his superior knowledge and skill, the Emperor was soon induced to grant the privileges of citizenship to all physicians in Rome. Later the Emperor created court-physicians, as well as city and district physicians, called Archiatri, with fairly liberal salaries; and the profession gained a fair standing among the Romans.

But much the larger number of those who gained a high rank were either Greeks, Egyptians or Hebrews, and most of the minor surgery and midwifery remained in the hands of barbers and female slaves.

CHAPTER III.

HISTORY OF MEDICINE FROM THE TIME OF GALEN, 131 A. D., TO THE END OF THE SEVENTH CENTURY, A. D.

Claudius Galen was born at Pergamos 131 A. D., and is reported to have died 204 A. D., aged about seventy-three years. He was the son of Nicon, an architect, by whom he was educated until he attained the age of fifteen years. He then commenced the study of the prevailing systems of philosophy and of medicine, first at Pergamos and subsequently at Corinth. At the age of twenty-one years he went to Smyrna, and after visiting the most interesting places in Asia Minor and Palestine, he went to Alexandria and spent considerable time in the great Library and Museum, and was much interested in the study of the complete human skeleton contained in the latter. Having acquired a thorough knowledge of the works of the most celebrated physicians and philosophers from the time of Hippocrates to his own day, he returned, at the age of twenty-eight years, to his native city, Pergamos, and engaged in the practice of medicine in connection with the gymnasium, and rapidly acquired a high reputation.

Six years later he changed his residence to Rome, where he not only engaged in general practice, but also in lecturing on anatomy and physiology, and by his unusual attainments and industry he soon attracted general attention. But the indulgence of an inordinate self-complacency in criticising freely all his contemporaries and nearly all the schools of philosophy and medicine that had prevailed before his day, caused him to be involved in bitter controversies and to become so filled with disgust that in a few years he abandoned Rome and returned to Pergamos. One year later, however, he was induced by the Emperor, Marcus Aurelius, to again visit Rome, where he became Physician-in-Ordinary to the ruler Commodus, and continued there until the end of his life; which has been stated by different authors as occurring in 200, 202, 204 and 206, A. D.

He was a very industrious student and prolific writer on a wide range of subjects. His works on grammatical, mathematical, philosophical and legal subjects numbered one hundred and twenty-five. His independent works on medicine were eighty-three; and his Commentaries on the works of Hippocrates were fifteen, beside which he left a large amount of unpublished manuscript.

His treatises on medical subjects, called "Canonical" because they remained the chief medical text-books through the Middle Ages, or more than 1,000 years, were his "De Usu Partium Corporis Humani"; "De Pulsibus"; "Ars Parva"; "Methodus Modendi"; "De Crisibus"; "De Differentiis Febrium"; and his Commentaries on Hippocrates. While he criticised freely the views of his predecessors, and denied affiliation with any preceding school, he nevertheless adopted nearly all the leading doctrines of Hippocrates and endeavored to construct upon them a more complete system of eclectic practice than that of Agathinus and Aretius, which he had freely denounced. The four elements, fire, air, water and earth, and the four cardinal humors, phlegm, blood, bile and atrabile, with the pneuma, or spiritus-vitalis, constitute the basis of all his doctrines, as they had of all his predecessors, except perhaps Asclepiades and his direct disciples. This could not be otherwise, so long as there was no science of chemistry by which the real elementary composition of bodies could be determined and the relations of such elements to each other. Yet Galen assumed that the spiritus-vitalis, or pneuma, was the primitive vitalizing force or soul, received through respiration and by penetrating every part of the body developed three general faculties designated as "animal", "vital" and "natural", and four special faculties or functions termed "attraction", "propulsion", "retension" and "secretion". To these special faculties, acting in different organs and structures, he attributed the processes of assimilation, nutrition, secretion and muscular movements. When the several humors and all these faculties or functions were in their natural condition it constituted health. Their disturbance or want of harmony constituted disease. He classified diseases under two heads, general and local.

The general diseases he attributed to disorder of the cardinal humors, and local diseases to disturbance of one or more of the special functions or faculties. He assumed that all general fevers were caused by concoction or putridity of the humors, even specifying that quotidians were caused by disorder of the phlegm, tertians by the yellow bile, and the quartans by the black bile. He also recognized the division of causes of disease into two classes, i. e., predisposing and exciting. And in his general anatomical and physiological views he, more distinctly than any previous writer, recognized the human body as the work or product of an intelligent, supreme or final cause, by which all its parts had been adjusted in harmony with a definite plan.

But the most important additions to our knowledge of real value, made by Galen, were in the departments of anatomy and physiology. Having gained a fair knowledge of the bones of the human skeleton by their study in the Alexandrian Museum, he recognized distinctly the cavities of the head, chest and abdomen, and by the dissection of animals was enabled to give a better description of the contents of each cavity than any of his predecessors. By such dissections he was enabled to give fairly correct descriptions of many of the muscles of the upper and lower extremities and of the neck. He distinguished the nerves from tendons and traced many of them to their origin from the brain and spinal cord; and by intelligent vivisections he demonstrated both the contraction of muscles and the motor function of certain nerves. He represented the motor nerves as hard and originating from the spinal cord, and the sensory nerves as soft and originating from the brain. The lachrymal glands with their ducts were discovered, and their secretion of tears described by him, such secretion having been previously considered to be an exudation from the aqueous humor of the eye.

Galen clearly described the three coats of the arteries and their connection with the heart, but still taught that they carried the pneuma or vital spirits, while he thought the veins originated from the liver and carried the blood concerned in nutrition. He states correctly that respiration is

effected by the action of the intercostal muscles and diaphragm, but claims that the air, or pneuma, not only fills the lungs but also passes into the heart and arteries. He represents the food taken into the stomach as passing from thence into the liver, where it becomes converted into blood and is then passed on into the right cavities of the heart, from which it is returned through the veins to all parts of the system and mostly used in the nutrition of the various structures. He devoted much time to the study of the pulse and its variations in health and disease, and wrote several papers concerning it. He also took note of the pulsating movements of the brain, which he regarded as the seat of the rational soul, while courage and the passions he located in the heart. In the domain of pathology he followed closely the views of Hippocrates both as regards the concoction of humors and the observance of critical days, or crises. He also recognized the tendency of acute general diseases to pass through successive stages, which he designated as the stadium initiale, incrementi, acmes and decrementi. These fairly represent the forming stage, the stage of increase, the climax and the stage of decline of modern writers. In the direct treatment of the sick, Galen followed closely in the footsteps of Hippocrates.

A more independent investigator and writer on the materia medica of that time was Padanius Dioscorides, of Anasarba, and later, of Cæsarea, in Cilicia. He visited most of the countries in the southern part of Europe and wrote a work on Materia Medica that was retained as the chief authority or text-book in that department for 1,400 years. The time covered by Dioscorides and Galen was that during which the Christian religion as proclaimed by Christ and his Apostles was being actively advocated not only in Palestine, but throughout the greater part of the Roman Empire. The zealous advocacy of the Jewish doctrine of one God as the maker and upholder of the universe, and one mediator between God and man, with the denunciation of the worship of all other Gods and Goddesses as idolatry, necessarily brought the converts of the newly proclaimed Christianity in direct antagonism to the various contemporary schools of philoso-

phy, and still more so with the methods of treating the sick at the various Æsclepiadæ, or so-called schools of medicine. The result of this conflict was little or no real progress in any department of medicine during the third, fourth and the first half of the fifth centuries of the Christian Era.

Constantine I. was the first of the Roman Emperors to embrace the Christian religion, and he commenced his reign during the last quarter of the third century A. D. In 312 A. D. he proclaimed at Rome absolute free toleration in religion. In 330 A. D. he removed his seat of government to Byzantium, which subsequently took the name of Constantinople, where the Emperor died in 337 A. D.

The great museum at Alexandria which had so long attracted the students and professional men of all the surrounding countries was first burned by one of the ships of Cæsar's fleet during a Roman invasion in 47 B. C. It was subsequently restored to a very great extent by Cleopatra, but was finally utterly destroyed by fire during a domestic revolt in 265 A. D. The great Alexandrian library was likewise burned, but not until an invasion of the Saracens in 640 A. D.

Fortunately for the preservation of the medical works of greatest value from the time of Hippocrates to Galen, Oribasius, of Pergamos, who was born 326 A. D., liberally educated generally, and specially in medicine at Alexandria under Zeno, became the personal friend and physician to the Emperor Julian, called the Apostate. He was appointed by the Emperor, Quæstor of Constantinople, and was requested to make a fair compilation of all the valuable medical works that had been written from the time of Hippocrates to Galen. Oribasius was well qualified for the task and completed it so far as to make a series of seventy books in the Greek language, in which were included works of Hippocrates, Erasistratus, Soranus, Archigenes, Dioscorides, Galen and many others. Some of his collations were accompanied by useful comments, and he is credited for good descriptions of both syphilis and gonorrhœa, and with being the first to recommend the use of urethral and vaginal injections in the treatment of the last named disease. As this was more than 1,000

years before the discovery of America by Columbus, it affords very good evidence that neither of those diseases were imported into Europe from America, as has been claimed by some more modern writers.

The medical writings of Oribasius furnished but little that was new or original in any of the departments, but was of very great value in preserving the most important part of the works of the early Greek and Roman authors in such form as to be transmitted to subsequent generations. And an excellent edition of his works was translated into French and published in Paris, in four volumes, by Bussemaker and Daremberg in 1851-62.

After the death of the Emperor Julian, to whose fortunes Oribasius had closely adhered, he was persecuted and banished from Rome to a country of barbarians. But he continued his writing and medical practice with such success that in a few years he was recalled and reinstated not only in favor, but was also recompensed for his losses, and retained a high reputation until his death, 403 A. D.

Cælius Aurelianus, a native of Sicca, in Numidia, was a teacher and practitioner of medicine in Rome during the last part of the fourth and beginning of the fifth centuries A. D. He wrote voluminous works on materia medica, "Chronic Diseases" and on "Diseases of Women", consisting largely of translations of the writings of Soranus of Ephesus. He is credited with having given a good description of gout and its treatment, and with having insisted upon the correct therapeutic principle that it was far more important to prevent the recurrence of the paroxysms than to combat the paroxysm itself. He advocated the condensation of milk, and the use of lime to prevent its coagulation. He improved the methods of differential diagnosis in regard to several diseases and even hinted at the practice of auscultation. He also opposed the resort to physical restraint and advocated seclusion in the management of nervous and mental diseases. His works gained a high degree of popularity and remained much in use during the six or seven succeeding centuries.

The great Roman Empire having been formally divided

into Eastern and Western Empires in 395 A. D., the Western rapidly declined in power, population and influence under the repeated invasions of the more barbarous peoples from the north, and the Eastern Empire, with Byzantium (Constantinople) for its seat of government, became relatively more important and more attractive for physicians and educated men generally. Consequently during the first half of the sixth century, during the reign of Justinian I., we find Ætius occupying much the same relative position in that city as had been occupied at Rome by Oribasius and Cælius Aurelianus. Ætius was born in Mesopotamia, 502 A. D., educated in medicine at Alexandria, but he returned to Byzantium to practise his profession, where he gained a high reputation and lived until 575 A. D. He embraced the doctrines of the Christian religion and was physician in ordinary to the Emperor Justinian I., who endeavored to close or banish all so-called pagan schools throughout the Eastern Empire . He devoted much time to the compilation of whatever he found valuable or remarkable in the writings of his predecessors, whether Egyptian, Greek or Roman. In doing this he produced sixteen books or "Sermones" on different medical subjects, the whole constituting a text-book of general medicine and surgery, in which he preserved the most valuable part of the works of Archigenes, Leonides, Soranus, Aspasia and many others that would have been otherwise lost. A Latin translation of his whole work was published in the sixteenth century (Basil. 1533-35). He was, however, not a compiler merely, but added many observations of value in both surgery and practical medicine. He recommends the use of many salves and plasters in the dressing of wounds; the irrigation of wounds with cold water, and the suppression of hæmorrhage by litigation and torsion. He also mentions the use of setons and the practice of lithotomy. He practised free venesection in the treatment of cerebral congestion and active inflammation, and recommends a decoction of pimperel (Anagallis Phœnicea) for hydrophobia and of pomegranate for the expulsion of worms. He mentions the prevalence of a disease of children,

evidently the same as now called diphtheria, and noticed the occasional occurrence of faucial paralysis following it.

While Ætius was attracting chief attention in the capital of the Eastern Empire, Alexander of Tralles, in Lydia, attained a similar position in Rome. He was born in Tralles, 525 A. D., the son of a physician named Stephen. His early education was directed by his father and a friend or patron whom he calls Cosmas. He had four brothers, all of whom were noted for their learning and success in various callings. His father and his brother Dioscurus, who was also a physician, subsequently settled in Constantinople, where they attained to influential positions. Alexander, after completing his home education, traveled and practised in Cyrene, Greece, Italy, Gaul and Spain, and finally settled in Rome, where he enjoyed a high reputation until his death, 605 A. D. After he had attained an age rendering him incapable of active practice, he wrote a highly interesting work on purely practical medicine as distinguished from operative surgery. He did not, like Orabasius and Cælius Aurelianus, fill his work with collations from preceding authors, but founded it largely upon his own experience and observations. He commenced with diseases affecting the head and proceeded in order downwards, ending with those affecting the feet. His work was written in Greek and consisted of twelve books or parts, styled "Libri duodecim de re Medica", under which title the whole work was translated into Latin and republished in 1549. He regards fevers as caused chiefly by irritation or disease of the stomach and intestines; recommends a seton or the establishment of suppuration at the seat of the aura accompanying paroxysms of epilepsy; and, contrary to the instructions of both Hippocrates and Galen, he declared that venesection could be practised properly on either side or in any convenient part, as the veins were all connected with each other.

In physical diagnosis, he applies pressure of the finger to detect œdema or anasarca; palpation in enlargement of the spleen; percussion in tympanites and succussion in ascites. He attached much importance to the consideration of the constitution, personal habits and age of his patients. He

cautions against implicitly following "Authorities"; yet he treats both contemporaries and predecessors with respect, and even eulogizes Galen.

Paul, or Paulus, of Ægina, sometimes called Æginata, appears to be the last of the Greek physicians who gained a prominent position in medical history. He was born in the Island of Ægina, probably near the end of the sixth century, received his medical education chiefly at Alexandria, traveled and practised in many countries and enjoyed a high reputation in both surgery and midwifery, during the reign of the Emperors Heraclius and Constantius, during the middle part of the seventh century A. D. It was during the early part of his career that Alexandria was captured by the Saracens, under the direction of the Caliph Omar, 640 A. D., and the celebrated library finally completely destroyed by fire. Paulus appears to have been strictly an itinerant practitioner, with no permanent place of residence, though the greater part of his life was spent in Egypt, Arabia and other parts of Asia Minor. He wrote a general treatise on medicine and surgery, composed of seven books or parts, in which he gave freely his own views and methods of practice, interspersed with copious extracts from Oribasius, Soranus and others.

The work was highly esteemed by the Arabians and was translated into their language and became the basis of much of their subsequent progress in the healing art; and, as a whole, it probably affords the best index of the actual condition of practical medicine, surgery and midwifery at the close of Greek and Roman dominance, and the beginning of the Arabian school in the middle of the seventh century A. D.

The sixth book in his series was devoted to surgery, and shows that much progress had been made both in devising instruments and in their use. He recommended and practised scarification, venesection and arteriotomy, always bleeding as near as possible to the affected organ; applied the actual cautery for the relief of deep-seated abscesses; washed out the bladder freely in chronic cystitis; ligated the veins in varicocele and treated hydrocele by incision; endeavored to reduce dislocations and applied splints to fractures as soon

after the injuries as possible, and forbade frequent changing of dressings. He advised trephining immediately after fractures of the skull; practised paracentesis of both chest and abdomen, also undertook tracheotomy, bronchotomy and lithotomy, and advised punctures of the membranes in hydrocephalus. He used a variety of forceps for the extraction of teeth, and for the removal of foreign bodies lodged in the flesh, and dilated rectal strictures by bougies. He described with considerable accuracy syphilitic ulcers on the genital organs of both male and female patients, and also gonorrhœa, but apparently without any knowledge of their specific causes or infectiousness. In diseases of the uterus he used the vaginal speculum freely, by which he was enabled to recognize fissures, excrescences, polypi and other morbid conditions of the vagina and neck of the uterus.

In general practice he gave opium in tetanus and other painful affections; practised venesection in apoplexy; used bathing and restricted diet in fevers, and did not deviate much from the rules inculcated by Galen.

The brief account now given of the leading medical men of the first six centuries A. D., whose writings and modes of practice have come to us sufficiently authenticated, afford a fair view of the progress of medicine during that period. The almost constant wars that were prosecuted during that time created an equally constant demand for surgeons to care for the wounded and physicians for the sick. This led each successive ruler, whether Christian or pagan, to secure for himself and his soldiers the services of the most eminent medical men within the sphere of his influence. This led to a steady advance in practical surgery, especially in the invention of instruments and operative procedures, and the writers of new works aimed largely at the collection of whatever was deemed valuable in the writings of their predecessors. The investigations in comparative anatomy and physiology that had been prosecuted with varying activity and success from the time of Aristotle to Galen, had been almost wholly neglected since. Consequently no advance had been made in these important branches of medical science,

and the whole tenor of medical and surgical practice was decidedly eclectic and empirical.

Notwithstanding the degraded condition of medicine in the Roman Empire prior to the conquest of Greece, and the bitter Roman prejudices against the introduction of Grecian philosophy and medicine, the great superiority of the latter was soon demonstrated by the influx of men educated at Alexandria, which soon caused their services to be required, not only with their armies but also in the cabinets and households of the successive emperors. Educated members of the profession were soon permitted to enjoy all the rights of citizenship; and during the reign of Antonius Pius, in the last half of the fourth century A. D., they were granted many special privileges, and some restrictions were placed upon the custom of allowing anyone to practise who might choose to do so. The physician to the King or Emperor was called Archiater, or royal healer. Popular Archiaters were also appointed, whose duty it was to attend to the poor and to perform many of the duties at present assigned to public health officers. Such were paid moderate salaries from the public treasury, and where such officers existed no persons were alloweed to commence the practice of medicine without an examination and license by the Archiater of the District.

Notwithstanding this partial organization of the better educated members of the profession and fair recognition of their social standing in the Roman Empire, a large part of medical practice remained in the hands of the more ignorant and superstitious part of the population. The rapid decline and closure of the Æsclepiadæ, so long the chief resorts for the sick and centers for medical instruction, following the edict of Constantine against them in 335 A. D., made it necessary to provide substitutes both for the care of the sick and for the preservation and increase of medical knowledge. The monasteries under the control of monks and priests became the most ready substitutes, especially as healing of the sick and help for the poor were inculcated as cardinal duties of the Christian life. And as healing of the sick and restoring the dead to life were resorted to by the author of Christianity and his immediate disciples as evidence of the truth of

their doctrines and their divine origin, it exerted great influence in again connecting medicine with religious institutions under the control of the priesthood. The same influences created in the minds of the female converts to Christianity great zeal in prosecuting charitable enterprises of various kinds. Consequently, while the Emperor Constantine was enforcing his decree for closing the Æsclepiadæ and all medical institutions under what was called pagan control or Greco-Roman philosophy that recognized the worship of many Gods, his mother, Helena, was devoting much of her time and means to the founding of a genuine hospital for the sick and poor in Jerusalem. With the aid of many others another was established at Antioch about 363 A. D., and as early as 373 A. D. a still more noted one was organized at Cæsarea.

Such was the beginning of the modern system of hospitals, asylums, and dispensaries for the sick and helpless that are now found in all the countries of Christendom. The founding of these institutions also led to the appointment of some person to prepare and dispense the medicines ordered by the physicians. And this was doubtless one of the chief influences creating the order of pharmacists, or apothecaries, as distinct from that of the physician.

CHAPTER IV.

HISTORY OF MEDICINE FROM THE SEVENTH TO THE FOURTEENTH CENTURY.—THE ARABIAN ERA.

In the preceding chapter the history of medical progress was traced from the time of Galen, the second century A. D., to the seventh century A. D. During that period the great Roman Empire had culminated in its greatness and divided into Eastern and Western Empires; and Rome, only a little before mistress of the world, had, under the repeated attacks of so-called Northern barbarians and the effect of internal dissensions, become little more than a heap of ruins. The Eastern Empire, with its capital at Constantinople, was still maintaining a semblance of power, though its downfall was rapidly approaching. During the same period the general aspect of medicine had undergone an equally radical change. The renowned school of Alexandria, with its library and museum, had been destroyed. The rapid spread of Christianity and its dominating influence throughout the Roman Empire had resulted in suppressing nearly all the Æsclepiadæ and associated medical schools. By doing so the intimate and long-continued connection of medicine with the ever-varying systems and schools of Grecian and Greco-Roman philosophy was effectually broken up. Many of the educated members of the medical profession embraced the Christian doctrines, and served as Archiators, and many others joined the monasteries and the newly organized hospitals for the sick and again reunited the functions of both physician and priest.

When the Emperor Justinian, 529 A. D., finally closed the only remaining important Æsclepion at Acropolis, and the Platonic School at Athens, their occupants, together with many of the Greek and Roman scholars, migrated into Syria, Arabia and other parts of Asia. They carried with them copies of the best works of the Greek and Roman authors, from Hippocrates to Galen. They were cordially received by Mahommed and Chosroes, King of Persia, and by translat-

ing their valuable medical books into the Syriac and Arabic languages they were readily introduced into the schools at Bagdad, Bassora and Damascus. Their work in thus laying the foundation for an Arabian era of medicine was much aided by a schism that had occurred among the Christians in Constantinople. Nestorius, sometimes called Bishop Nestor, had been appointed Patriarch of Constantinople, 428 A. D., and with his numerous followers controlled an important school at Edessa. The school was accompanied by a hospital for the sick, in which the medical students received some clinical instruction. After a few years Nestorius was subjected to a charge of heresy, which led to much theological controversy and resulted in his banishment and the closure of the school by the Emperor Zeno, 489 A. D.

The school was under the charge of an able faculty of teachers who, with most of the followers of Nestorius, fled into Syria and Arabia and soon founded another school at Nisibus, in Mesopotamia. They carried with them copies of many of the best works of Greek and Roman authors in both philosophy and medicine, and Bishop Ibas, aided by Cumas and Probus, attached to the new school, translated the works of Aristotle into Syriac, and the school was much patronized by Jewish, Syrian and Arabian scholars and students of medicine. Some historians have credited these Nestorian schools, both at Edessa and Nisibus, with having been the first to require a definite course of study in medicine, and to grant certificates authorizing the holders to practise the healing art. And it was also largely through their influence that pharmacies for the preparation and dispensing of medicine became a distinct business separate from the practice of medicine.

It was thus by the influence of the migration of the Nestorians from Constantinople and Edessa, and the closing of the schools at Acropolis and Athens by Justinian, that the Greek and Roman philosophy and medicine became transferred to, and firmly established in, the schools of Syria, Arabia and Persia, and were fostered by Chosroes, King of Persia, Mahommet and their successors from the sixth to the eleventh century A. D., constituting a distinct era in the

progress of medicine as well as in the progress of nations, an era in which Nisibus, Bagdad, Bassora and Damascus became the chief seats of learning instead of Athens, Alexandria, Rome and Constantinople.

The first physicians to gain general reputation in Arabia were from a Nestorian family named Bachtishua (i. e., Servants of Christ). Bachtishua ben Jurjis is said to have cured the Caliph Haroun el Raschid of headache by venesection, while his son cured the same Caliph of an attack of apoplexy. Another Nestorian physician, named Mesue, the Elder, gained a high reputation as a translator of valuable Greek and Latin works into the Syriac and Arabian languages, and in the early part of the ninth century was director of the hospital in Bagdad.

Honain, of Hira, was another prolific translator of medical, philosophical and scientific works, for which he received as compensation the weight of the manuscript in gold. He became widely known as a physician and writer on some medical topics. He appears to have adopted many of the more fanciful doctrines of Galen and Plato, but left no additions to the sum of real medical knowledge. He was born in 809 and died in 873 A. D.

Rhazes, born at Rai, 850 A. D., was one of the most eminent of the Arabian writers and practitioners of both medicine and surgery during the last part of the ninth century. He became one of the most eminent teachers of medicine in the school ot Bagdad. He wrote many works on both philosophy and medicine, but the two most important were his "El Hawi" or Liber Continens, and his Aphorisms, which were retained in use during several centuries. These works show that he was familiar with many surgical procedures, such as were required in the treatment of trichiasis, entropion, ectropion, cataract and fistula lachrymalis, also with tracheotomy, tonsillotomy, and the removal of necrosed and carious bones, the closure of hare-lip and fistulous tracts. His teachings in anatomy, physiology and pathology show no advance beyond what had been derived from translation of the works of Galen and other Greek and Roman authors.

In the treatment of diseases he adheres closely to the

principles inculcated by Hippocrates, but in semeiology and prognosis he makes some valuable additions to our previous knowledge. His excellent descriptions of smallpox and measles are the earliest that have been handed down to us, and justly entitle him to the position of a pioneer in dermatology. To the materia medica he added, for external use, preparations of arsenic, sulphate of copper, and mercurial ointment. Late in life he became blind and poor, and died in his native city in 923 A. D.

Closely following Rhazes was Ali Abbas, an Arabian physician who compiled the "Royal Book" or treatise on medicine, which was later translated into Latin by Constantius Africanus, who was the first author to introduce the Arabian writings into Europe.

Perhaps the most eminent of the Arabian physicians was Avicenna, a native of Bokhara, born in 980 A. D. His Oriental education consisted in a complete knowledge of the Koran before he had passed his tenth year of age. He then rapidly acquired a knowledge of grammar, arithmetic, geometry, dialectics and astronomy. He next made a thorough study of the philosophy of Aristotle, and then commenced the study of medicine under Nestorian teachers at Bagdad. Such was his proficiency that at the age of sixteen years he was declared to be qualified to teach and practise his profession. Five years later he had written an encyclopedia entitled by him, "Book of the Sum Total". Later, he became the author of many works and commentaries, the most important of which was the "Canon", in which he gave an excellent collation of the views of many of the most eminent Greek authors. It was translated into both Latin and Hebrew, and was in general use for four or five centuries in Europe as well as in Asia. Early in his career he became Vizier to the Emir of Hamadan, and lectured on both philosophy and medicine, at the close of each lecture indulging in feasting and dancing. After the death of the Prince of Hamadan, Avicenna was suspected of improper correspondence with parties at Ispahan, and thrown into prison. After being liberated he fled to Ispahan, where he again attained a high reputation, abandoned the excesses of his earlier years, freed his slaves, gave

much of his fortune to the poor, and died at the age of fifty-eight years. Notwithstanding the high reputation attained by Avicenna and the length of time that his "Canon" was accepted as authority, we find in it but little that is new or in addition to what was previously known. In his comments on materia medica he recommends the internal use of camphor, preparations of iron, cubebs, aloes, manna, amber, sublimate, and gold and silver as blood purifiers, which shows a decided tendency to use more mineral and chemical remedies than any of his predecessors.

No true science of chemistry had yet been developed, but the alchemistic theory of a philosopher's stone, an elixir of life, and the transmutation of metals, more or less prevalent among the Egyptians, Greeks and Romans as early as the fifth century A. D., found enthusiastic disciples among the Arabians. Many of them experimented actively, especially in efforts to render the metals soluble and thereby transmute the less valuable into gold or silver. Perhaps Jaffar, or Geber, who lived during the last half of the eighth century A. D., became the most eminent, and made some discoveries of importance. Previous to his time the strongest acid known was concentrated vinegar. He, however, succeeded in making nitric acid by distilling a mixture of blue vitriol, alum and saltpetre; and he made aqua regia or nitro-muriatic acid by adding to the same mixture sal-ammoniac (ammonia hydrochlorate). With his aqua regia he was enabled to dissolve gold, an object long sought in vain by his predecessors. He also described the absorption and evolution of gases by and from liquids and solids, and was familiar with the processes of filtration, distillation and sublimation.

Rhazes, while chief physician to the hospital in Bagdad, made sulphuric acid by distilling green vitriol, and also absolute alcohol by distilling spirits over quicklime.

While the Arabian schools were thus conserving all that was valuable in the Greco-Roman medicine and philosophy and making here and there some valuable additions, the followers of Mahommet had rapidly gained control over Arabia, Persia and the greater part of Asia Minor, and before the end of the seventh century had defeated the Eastern Roman

government at Constantinople and led their Saracen legions through the whole southern part of Europe. In doing so, they brought back into Europe all that was valuable in Grecian and Roman learning, dressed in Arabic language, with such additions as have been indicated, and re-established a school of medicine at Salernum, a former health resort near Naples, and subsequently schools at Montpellier, Cordova and Seville. These schools, as well as those at Bagdad and Damascus in Asia, received the fostering care of the successive Moorish Caliphs, and constituted the chief seats of learning, including medicine, during the eighth, ninth, tenth and eleventh centuries, which was pre-eminently the era of Arabian medicine. Though not characterized by any great discoveries, it is justly credited with having received and fostered the most valuable part of Egyptian, Grecian and Roman medicine and literature, as they were driven out of Europe, and again in due time re-established them in Italy and Spain, from which they were finally redistributed to all parts of Europe, constituting the period styled in history "the revival of learning" following the dark ages.

The Arabians are credited with not only the addition of several valuable remedies to the materia medica and the discovery of the mineral acids, but also the preservation of a distinctly medical profession based on a clinical study of diseases, their remedies, and some elements of natural science, with less reference to theology or supernatural agencies.

The overthrow and final extinction of Arabian leadership or even activity in medicine came when in 1236 A. D. Cordova fell under the control of Ferdinand of Castile, and in 1258 A. D. Bagdad was taken possession of by the Tartars.

Aside from what has been said concerning Nestorian and Arabian schools, very little progress was made in any department of medicine from the end of the seventh to the beginning of the fourteenth century. Medical and nearly all other sciences and arts retreated to the monasteries and the care of monks and ecclesiastics, who were far more influenced by papal edicts and so-called supernatural agencies than by clinical observation and experimental inquiry. Yet, during all this dark period, influences were visibly prepar-

ing the way for the revival of learning that followed. Important monastic schools were founded in England at Oxford, 635 A. D., and at Cambridge, 670 A. D., and Charles I., King of France, better known as Charlemagne, who for more than thirty years prosecuted a relentless and successful war, during which he subdued the inhabitants of Saxony, Lombardy, and Bavaria, and compelled them to adopt the Christian faith, as expounded by papal authority, became also a zealous patron of learning and the arts. He invited to his court men of learning from Italy, and established the "Palatine School," which, like our normal schools, was designed to qualify persons to teach arithmetic, grammar, rhetoric, logic, history, astronomy, theology and medicine, and then had them go into the provinces and keep alive some educational work among the people. After the death of Charlemagne the vast empire constructed by him, extending from the English Channel to the western borders of Asia, underwent rapid disintegration into many petty kingdoms, and all learning, professional and otherwise, remained under the dominating influence of the monks, priests and bishops, among which those of the Order of St. Benoit enjoyed the highest reputation for medical skill.

Notwithstanding the religious rites of the Jewish Church forbade all attention to the diseases of Christians many Jews studied medicine under Arabian physicians and retained a fair share of medical practice until near the end of the eleventh century, when the preaching of Peter the Hermit began to kindle throughout all Europe the wild fires of the Crusades.

During all those preceding centuries besides the Monks, Priests and Jews who maintained some semblance of education, there were large numbers, including barbers, servants and slaves, both male and female, with no education, who endeavored to administer to the sick and wounded wherever they were met with. There were no courses of study prescribed to qualify any person to engage in practice, nor laws forbidding anyone to practice who might desire to do so. For though the Nestorian schools were said to grant certificates to such as had completed certain studies, and Theo-

doric, King of the Visigoths, issued a decree requiring every physician and surgeon to make full restitution for any injuries suffered by patients while under their treatment, neither forbade any to engage in practice. The medical school that had been founded during the latter part of the seventh century A. D., at Salernum, being directly on the route of the Crusading legions from Europe to Jerusalem or the Holy Land, near the end of the eleventh ceutury received a great increase of patronage and remained the most important center of medical instruction until the beginning of the fourteenth century. It was at that institution that Robert, of Normandy, on returning from the siege of Jerusalem with a wounded arm, remained until recovery. On leaving he was presented with a Latin poem entitled "Regimen Sanitatis Salerni", which was received with great popular favor, and was published in this country by Dr. Ordronaux in 1871. The most important lesson inculcated in the poem is contained in the following lines addressed to England's King:

"If thou to health and vigor wouldst attain,
Shun mighty cares, all anger deem profane;
From heavy suppers and much wine abstain;
Nor trivial count it after pompous fare
To rise from the table and to take the air.
Shun idle noonday slumbers, nor delay
The urgent calls of nature to obey.
These rules if thou wilt follow to the end,
Thy life to greater length thou may'st extend."

—(Ord.)

During the first half of the thirteenth century, by the fostering care of Frederick II., King of Naples, the school at Salernum reached the zenith of its prosperity and influence. The "Compendium Salernitanum", the chief medical textbook of the school, was designed to include all the departments of medicine and was the work of six writers each eminent in his department. It was thus the prototype of our modern encyclopedias or works of many authors. The several writers simply made fairly good compilations from

Arabian, Grecian and Roman authors, and their work remained a popular text-book not only in Salernum but also in the schools at Bologna, Padua, Pavia, Montpellier, Cordova and Paris, for the increased demand for accommodations for the sick and wounded during and following the vast military operations of the Crusades led to a rapid increase in the number of monasteries, hospitals and medical schools.

During the first half of the twelfth century Nicholas Præpositus, President of the school at Salernum, wrote a work on pharmacy called the "Antidotarum" that acquired great popularity. He used in his work the well-known system of apothecaries' weights and measures, and is said to have given one prescription from St. Paul and others from the Prophet Elias. In none of the works produced by the patrons of this school do we find any really valuable additions in any department of the field of medicine. They gave chief attention to materia medica and practical medicine, generally following closely the doctrines of Hippocrates and Galen, especially in regard to baths, diet, the use of mild laxatives, and free venesection in the more acute inflammatory affections. Anatomy and physiology appear to have made no progress from the time of Galen to the end of the thirteenth century, in any of the medical schools of Europe, as both Christians and pagans still regarded any dissection of the human body for the purpose of gaining useful knowledge as sacrilege.

Yet early in the thirteenth century, Frederick II. published an edict forbidding any person from practising medicine in the Kingdom of Naples until after an examination by the Faculty of the School of Salernum on the Therapeutics of Galen, the first Book of Avicenna and the Aphorisms of Hippocrates, text-books from six to sixteen centuries old.

One prominent characteristic of medical writers during the twelfth and thirteenth centuries was the adoption of a poetic or versified mode of expression. Thus, Ægidius, of Corbeil, physician to King Philip Augustus, wrote in verse on "De Urinus", "De Pulsibus" and "De Laudibus et Virtutibus Compositorium Medicaminum", and Alcadinus, of

Syracuse, physician to Frederick II., composed a poem on "De Balner's Puteolanis". He was also one of the teachers at Salernum.

Another marked feature of the same centuries was the unusual number of women who studied and practised the healing art, and in some instances became teachers and writers, thereby again reminding us that women practitioners of medicine are by no means the exclusive product of the last half of the nineteenth century. Perhaps the persistent experimental search for the philosopher's stone and elixir of life by the alchemists, and the religious enthusiasm of the Crusaders, so elevated the mind of man that his ideas on the most common topics had to be expressed in poetry, and that of woman that she was compelled to pass from the family circle to the wider field of medicine.

It is more probable, however, that the greater tendency of women to study and practise medicine during this dark period of human history was caused by the interest she felt in the organization and maintenance of hospitals and dispensaries for the sick and helpless under Christian dispensation, to take the place of what was called pagan or infidel Æsclepiadeæ and schools of philosophy previously existing.

In the preceding chapters of this work very little has been said concerning the character of the epidemic diseases that are known to have prevailed more or less during all the past ages, and especially during the first thirteen centuries A. D. There is sufficient evidence in both the historical and medical writings to show that from the earliest periods of time chronic diseases of the nervous, digestive and vascular systems, with occasional acute inflammatory attacks, and the endemic fevers of malarial or periodical type, were the diseases ordinarily met with in all the inhabited countries of which we have any records. That the allusions to fevers should generally indicate those of periodical form was evidently dependent upon the fact that the geological, topographical and climatological conditions of Egypt, Greece, Rome and Asia Minor were such as to favor the annual prevalence of that form of disease.

In addition, however, to these ordinary diseases there are

in the earliest historical and medical records indications of the prevalence, at irregular intervals of time, of the rapid development and wide spread of acute febrile diseases, resulting in so great a degree of mortality as to cause the utmost dread or mental anxiety. Such outbreaks of disease are called epidemics, and from the earliest times they were indicated by the words Pest, Pestilentia or Plague. Prior to the commencement of the Christian era, and for several centuries later, the prevalence of such epidemics was very generally attributed to the anger of the Gods and were often thought to be preceded or accompanied by unusual or violent natural disturbances, such as earthquakes, volcanic eruptions, the appearance of comets, etc. Consequently, very little effort was made to investigate their real causes or to devise any rational modes of treatment, the latter generally consisting of prayers, sacrifices, the kindling of bonfires, etc.

But the first great epidemic of the Plague, of which we have a reliable history, commenced in lower Egypt in 542 A. D. and extended up the Nile and eastward into Asia Minor, and soon reached Constantinople, where it is claimed that more than 5,000 human beings died daily when the disease was most active. The next year it extended westward over Greece and Italy, and in 545 it invaded Gaul and the next year reached the Rhine. It did not cease its activity for twelve or fifteen years, during which time it decimated the population of Paris and London, as well as most of the densely populated parts of Europe, Asia and Northern Africa. As this great and destructive epidemic commenced soon after Justinian I. became Emperor at Constantinople, it has generally been designated as the "Plague of Justinian". The disease continued to recur with varying degrees of intensity at intervals of from fifteen to thirty years, commencing generally in Egypt, Syria or on the eastern borders of the Mediterranean Sea, and extending over most of the countries of Europe, until the seventeenth century.

The Plague appears to have been a highly malignant typhus fever, frequently terminating fatally in from one to three days, and when more protracted becoming complicated with inflammation of the lymphatic glands of the groin, arm-

pit and neck, thereby giving it the name of "Bubonic Plague". With the glandular swellings in many cases came also carbuncles on the back, hips and legs, and if the patients lived beyond the first week extensive suppuration generally took place in both glands and carbuncles and the prospect of final recovery was increased. The outbreaks of the plague generally followed closely unusual periods of famine, whether caused by failure of crops or the ravages of war; the accumulations of stagnant and impure water after floods; and the overcrowding of population in cities, with neglect of both ventilation and cleanliness.

In addition to the epidemics of plague, during the sixth and seventh centuries, variola, or smallpox, and measles were introduced into Europe through intercourse with Arabia, and especially through the Saracen invasions. They had doubtless prevailed in India and China at a much earlier period, but were first clearly described by the Arabian physicians Ahrun and Rhazes in the seventh century. From that time to the introduction of vaccination, near the end of the eighteenth century, smallpox recurred in epidemic form and spread over the greater part of Europe at such frequent intervals that it became the most dreaded scourge of mankind. The best of English medical writers have estimated that the average annual mortality from this disease alone exceeded 200,000 for the whole of Europe. This great mortality was often added to by outbreaks of measles, scarlet fever and diphtheria, then called cynanche maligna. The principal reason why the whole of Europe was not literally depopulated during the centuries directly considered in this chapter by the combined influence of almost constant wars and pestilential epidemics, was the fact that those who survived one attack of either eruptive fevers or plague were generally rendered immune or exempt from subsequent attacks of the same disease.

CHAPTER V.

THE HISTORY OF MEDICAL PROGRESS DURING THE FOURTEENTH, FIFTEENTH AND SIXTEENTH CENTURIES.

The Origin and Development of Human Anatomy and of Inorganic Chemistry.

The beginning of the fourteenth century A. D. was especially characterized by renewed attempts to study human anatomy. As shown in the preceding chapters the study of anatomy, even by the dissection of animals, had been almost suspended during the whole of the Arabian era of medicine and the re-establishing of medical schools in Europe under the Christian dispensation; i. e., from the second to the fourteenth century A. D. But the constant demand for better educated physicians and surgeons to accompany the armies and serve in the hospitals, made necessary by the almost constant wars, as well as by the frequently recurring epidemic diseases, rendered a better knowledge of the anatomy of the human body imperative. The leading influence gained by the Italian Schools under the more enlightened policy of Frederick II., and the increasing demand for experimental inquries by the Alchemists, awakened a bolder spirit of inquiry in other directions. In accordance with this spirit Dr. Mondino de Luzzi, Professor of Anatomy in the school at Bologna, boldly caused a human body to be dissected before his class of medical students in 1306. Not possessing quite courage sufficient to handle the knife himself, he is said to have employed a barber to do the dissecting, while he pointed out the different parts with a rod. Two years later, 1308, the Senate of Venice, in defiance of the decrees of Pope Boniface VIII., enacted a law allowing one dead human body to be annually used for the study and teaching of anatomy.

This is probably the first act of a legislative body directly authorizing the use of a limited number of human bodies

for the purpose of better qualifying physicians and surgeons to alleviate the suffering of the living. Such, however, was still the dread of incurring the anathemas of the Ecclesiastics, that we learn of only two more bodies being used by Mondino in the school at Bologna in 1315, and none in the school at Prague until 1348, in that at Montpellier until 1376, and in the one at Strasbourg until 1517. During all the prosperous years of the school at Salernum they used chiefly the hog for demonstrations in anatomy.

Mondino de Luzzi, however, industriously wrote descriptions of the parts dissected under his direction, and in 1316 published his celebrated work entitled, "Anatome Omnium Humani Corporis Interiorum Membrorum", which served as a text-book on human anatomy in all the medical schools during the next three centuries. Although very incomplete and erroneous in many parts, resulting from the hasty and imperfect method of dissection, it constituted the real beginning of human anatomy as one of the fundamental branches of medical science. Mondino was a son of an apothecary of Bologna, and followed the same calling until he became one of the professors in the medical school. He was born in 1276, and died at Naples in 1326, where he was serving as deputy to King Robert.

After the death of Mondino, very little progress was made in the correction and development of human anatomy until the beginning of the sixteenth century, when Andreas Vesalius, of Brussels, appeared upon the stage of action. He was born in 1514. His ancestors for, at least, three generations had been physicians. He received his primary education at Louvain, and studied medicine in both Montpellier and Paris with such success that he returned to his native city at the age of twenty years. At Paris he was under the instruction of Silvius and acquired an extraordinary zeal for the study of anatomy. Near Louvain was a noted place for the execution of criminals, and it is said that Vesalius boldly and skillfully stole some of his subjects for dissection directly from the gallows after their execution. At the age of twenty-three

years he became Professor of Anatomy at Padua, and subsequently gave instruction in both Pisa and Bologna.

In 1543, he caused to be published his remarkable work, "De Corporis Humani Fabrica Libri Septem"; illustrated by excellent wood cuts, drawn from nature by John Stephan, a pupil of Titian the artist. At first the work was met by violent opposition from much the larger number of his contemporaries, chiefly on account of his numerous and bold corrections of the errors in the anatomical writings of all his predecessors from Aristotle to Mondino. His critics were simply challenged to prove their charges by actual dissections. So far as they were induced to do this he was not only fully vindicated, but a much better knowledge of human anatomy was rapidly developed in all the medical schools of Europe. The same year that his great work on anatomy was published (1543) Vesalius became physician to the Emperor, Charles V., and accompanied him in his campaigns through Belgium and Germany. About 1556, he became physician to Philip II., in Spain. While there he met with so much opposition from the priests that he suddenly left on a pilgrimage to Jerusalem, in 1563. Soon after his arrival in that city, he received notice of appointment to a professorship in the medical school at Padua. In returning he was shipwrecked and he died, on the Island of Zante from injuries received, at the age of fifty years.

The most noted anatomists after Vesalius during the last half of the sixteenth century were Columbus, a pupil of Vesalius, while at Padua; Eustachius, at Rome, Fallopius, of Modena; Fabricius, of Padua; Cæsalpinus, also of Padua; and Thomas Vicary, of London, who published a book on the "True Anatomy of Man's Body" in 1577.

Columbus, who followed Vesalius at Padua, described the systole and diastole of the heart with the dilatation and contraction of the arteries. He also pointed out the fact that the blood passed from the right side of the heart to the lungs and returned as arterial blood through the pulmonary veins to the left side of the heart, but he failed to comprehend the mechanism of the circulation of the blood.

Eustachius was an eminent teacher of anatomy in Rome, a defender of the authority of Galen as against Vesalius, and yet he improved our knowledge of the kidneys, the teeth, and discovered the ducts connecting the fauces with the middle ear to which his name is attached.

Fallopius, a native of Modena, taught anatomy with great success both at Pisa and Padua; and his name has remained attached to the tubes through which the ovum passes from the ovaries into the uterus.

Fabricius, a native of Aquapendente, was a pupil of Fallopius and succeeded him as teacher of anatomy at Padua. He described more fully the valves in the veins, and by an extensive investigation of the progress of embryology in animals he made important additions to the previous knowledge concerning the development of the fœtus and its membranes, as seen in his work "De Formato Fœtu."

Until the times of Fabricius and Cæsalpinus dissections were made with the razor, but that instrument of the barber now gave place to the scalpel and many other improved facilities for making anatomical demonstrations, and skilled artists furnished excellent cuts and engravings to illustrate their works.

Thus at the close of the sixteenth century simple descriptive anatomy had reached a degree of development entitling it to recognition as a distinct department of medical science.

CHEMISTRY: The origin and progressive development of chemistry as a science presents a most interesting field for study. The name chemistry is supposed to have been derived from Chemia, the original name of Egypt, and was called the "Egyptian Art", on the supposition that it originated in that country. The truth is, however, that all of the ancient nations and tribes were possessed of some chemical facts and processes gained by simple empirical observation and experience. Thus the Egyptians early acquired considerable skill in smelting ores, working metals, and in making dyes for coloring. The Hebrews were well acquainted with gold, silver, copper, tin, lead and iron, and

many of their uses. And the Phœnicians were skilled in dyeing, making glass, pottery, etc. There is no evidence, however, that any of these people had any knowledge of the elementary composition of the substances they handled, or of the laws governing their combinations. But the same mental tendencies which had caused them to assume that the world was made of the four elements, fire, air, water and earth, led them to assume that all the various metals were made of sulphur and mercury, and as early as the fourth century A. D., the idea of converting the less valuable metals into the more valuable, as silver and gold, began to be discussed by the Egyptians and Greeks. The same problem was communicated to the Arabians during their invasions of Egypt in the seventh century A. D., and from that time its solution became an absorbing passion with the educated classes during all the succeeding eight centuries.

The theory on which their investigations were based was that mercury was the fixed or undecomposable metal that imparted lustre and malleability to all the other metals; while sulphur was thought to be decomposable and liable to many adulterations. All the metals were supposed to be composed of these two in different proportions and in different degrees of purity. This view was doubtless strengthened by the fact that iron, copper, lead, etc., were generally found in their native ores in combination with sulphur.

As was stated when discussing the Arabian era of medicine, all those who embraced the foregoing theory were called Alchemists or searchers for the philosopher's stone that was supposed to be capable of converting all the baser metals into silver and gold. A large proportion of them were medical men, among whom, Geber, the Arabian, was one of the most eminent. By his experiments he learned how to convert metals into oxides by heat; how to purify native sulphur; and how to make alum, saltpetre, sal-ammoniac and green vitriol. He and his pupils also gave a good account of the carbonates of the fixed alkalies; of sulphuric acid as obtained by distillation of alum; of nitric acid by distilling saltpetre and green vitriol; of acetic acid from vinegar; and of alcohol from wine. With their acids

they made several salts, the most important of which were nitrate of silver and bichloride of mercury. Geber published a work on the construction of chemical furnaces and other apparatus.

The Arabians thus made a substantial beginning in chemistry between the eighth and twelfth centuries A. D. Following them in the thirteenth century were such leaders as Albertus Magnus, in Germany, Roger Bacon, in England, and Raymond Lully, in Italy. They, however, added but little to what had been accomplished by Geber and his followers in Arabia.

Bacon was popularly known as "Dr. Mirabilis", and Lully as "Dr. Illuminatissimus." The latter finally joined the Franciscan frairs and went as a missionary to Africa, where he was killed by the Saracens.

During the fourteenth century the doctrines of the Alchemists became thoroughly diffused throughout Europe, and were embraced by many of the monks and priests notwithstanding the formal edict forbidding it, issued by Pope John XXII., in 1317 A. D.

Among the most noted of these was Basil Valentine, during the last half of the fifteenth century. He was a Benedictine monk of Erfurt, and is credited with having discovered antimony; of making some qualitative analyses, and of having used some preparation of antimony in the treatment of diseases. He also represented common salt (chloride of sodium) as a third elementary metal.

Up to the commencement of the sixteenth century all medical teaching in the schools and universities of Europe was conducted in the Latin language, and adhered tenaciously to the leading doctrines of Hippocrates and Galen. Notwithstanding this, and the repressing influence of the edicts of Popes and Ecclesiastical Councils, a spirit of rebellion or independence of thought and action became visible during the fourteenth and fifteenth centuries. Early in the sixteenth century that spirit broke forth as a meteor, in the person of Theophrastus Bombast von Hohenheim, usually called Paracelsus. He was born in 1493, near Maria Einsiedeln, in Switzerland. He received his primary edu-

cation under the direction of his father, who was also a practising physician. At the age of sixteen years he entered the University of Basil, where he enjoyed the use of the laboratory of Sigmund. On leaving the University he engaged as an army surgeon in the Venetian, Danish and Netherland wars; and subsequently travelled extensively through Spain, Portugal, Prussia, Denmark, Egypt and the Orient, as he said, "in order to understand the wonders of nature," for he declared that, "Reading never made a doctor, but practise is what forms the physician."

At the age of thirty-two years he returned to Germany, and engaged in the general practise of his profession. His success, coupled with an unusual independence of expression, soon gained for him a good reputation, and in 1527 he was given a professorship at Basil with a liberal salary. But regardless of the universal custom of teaching in Latin, he gave all his instruction in the language of his own country, the German.

He also indulged in violent denunciation of the authority of Galen and Avicenna, and is represented to have publicly made a bonfire of their works. These acts soon involved him in controversies so extensive and bitter as to compel him to leave his position in the University. He then became an itinerant practitioner and teacher, and by lecturing and writing in the native language of the country he everywhere attracted followers, and by the energy of his assaults upon all, so-called, established authorities, he compelled even his adversaries to exercise more independence of thought and expression in their own defence. He also aided much in turning the attention of the Alchemists from the transmutation of metals to the discovery of new remedies for the treatment of diseases. He even boasted of having discovered a universal remedy called the "Elixir of Life." Nevertheless he died from the combined effects of poverty, dissipation and disease, at the early age of forty-eight years.

During the last part of the sixteenth century the extreme pretensions of the Alchemists began to be opposed by Libavius and Van Helmont. The former was a phy-

sician of Coburg, who improved the processes for making sulphuric acid and made a preparation of bichloride of tin, which is still called the fuming liquor of Libavius. Van Helmont boldly denied the four elements of the ancients, claiming that fire was not a substance. He equally denied that the elements of the Alchemists, sulphur, mercury and salt, were elements of either animal or vegetable bodies, and in their place he put forth the claim that water was the chief element of all things. To demonstrate the correctness of this claim he planted a willow, weighing only five pounds, in a pot filled with earth, and for five years gave it nothing but water and air. At the end of the time the willow weighed one hundred and sixty-four pounds, while the earth in the pot had only lost two ounces. He described several gases, and appears to have been the first to use the word gas to designate a chemical product.

The sixteenth century thus closed with some real chemical progress, and the adoption of some true methods of investigation, though the bitter controversies between the followers of Paracelsus and the persistent defenders of the ancient Greek and Roman authorities were at the height of their activity.

Progress in the other departments of medicine, during the three centuries under review, was less than in anatomy and chemistry. But the revival of the study of human anatomy and the constant demand for operative surgery caused by the frequent wars, certainly led to many improvements in the departments of both surgery and midwifery. In the Italian, and indeed all the medical schools of Europe, during these centuries anatomy, surgery and operative midwifery were taught by the same person. Consequently, the most eminent anatomists were generally found among the most active surgeons.

For a long time a warm controversy was maintained concerning the question whether the dressing of surgical and other wounds should be wet, as advised by Hippocrates, or dry, as suggested by Galen. The disciples of the school at Salernum followed the former, and those of the school at Bologna adhered to Galen. The same question was again

persistently discussed in some of the medical journals only a few years since.

Besides those who used wet, relaxing dressings (poultices), there were many who used soothing ointments; and those more directly connected with the armies used wine and oil, aided by a covering of wool. As nearly all the educated physicians were of the order of the Priesthood, and persistently forbidden to shed human blood, practical surgery was so long compelled to remain in the hands of barbers and less educated persons, that, coincident with the revival of anatomy and the multiplication of medical schools, the more intelligent barber surgeons began to demand a better recognition in the schools and a more equal standing with physicians. In France, before the close of the thirteenth century, under the leadership of Jean Pitard, royal surgeon to St. Louis, the reigning monarch, an association of the better educated surgeons was formed under the name of "Collège de Saint Côme." This organization claimed a board of examiners, and established a respectable standard of education for admission, including a knowledge of Latin, the study of medicine and philosophy in a university two years, and the study of surgery two years more. The Collège of St. Côme, thus organized, was sustained until 1713, when it was merged into the "Academie de Chirurgie", and exerted much influence in elevating the condition of surgery, especially in France.

Early in the fourteenth century the more intelligent barber surgeons of London, England, under the leadership of Thomas Vicary, formed an association or guild for similar purposes, which became a chartered organization in 1461, under the title of "Masters of the Commonality of Barbers of London."

A similar organization was formed in Hamburg in 1452.

By all the foregoing influences the practice of surgery was being gradually elevated to a higher educational plane, while the introduction of dissections of the human body for the study of anatomy in nearly all the medical schools compelled greater familiarity with it by physicians, and inclined a larger number of them to practise surgery as well

as medicine. Thus the two classes of medical practitioners were being drawn nearer together.

During the last years of the thirteenth century Lanfranchi, of Milan, a surgeon well educated in the Italian schools, accepted membership in the Collège de St. Côme" at Paris, and gave lectures that were attended by large numbers of students. He published a work on both Major and Minor Surgery, in which he advocated the free use of the actual cautery, but showed much timidity in the use of the knife. He was followed, in the early part of the fourteenth century, by Guy de Chauliac, who studied medicine at Paris, Montpellier, and Bologna, and became chaplain and physician of Pope Urban V. Subsequently he practised many years at Lyons. While Chaplain of the Pope at Avignon, 1363, he published an important work known as the "Chirurgia Magna", which was accepted as the ruling surgical authority for many years throughout France. This work though containing very little that is new or original, contains a very fair statement of surgical views and practices at the time it was written, with less intermixture of purely fanciful dogmas than in previous works. He recommended venesection according to the location and nature of the disease; opened freely fistulous tracts and deep-seated abscesses; and applied the actual cautery for caries, anthrax and open cancerous and leperous cases. He gives very fair directions for the treatment of dislocations, fractures, and surgical diseases of the eyes. He relates cases of trepanning, lithotomy, the removal of pharyngeal polypi, and the removal, by amputation, of supernumerary limbs. He endeavors to so adjust wounded surfaces as to favor union by first intention, and arrests hæmorrhage by styptics and pressure when possible, applying actual cautery only in bad cases.

During the third quarter of the fourteenth century, John Ardern, an English surgeon, who practised first in Newark and subsequently in London, gained considerable reputation for the treatment of "Fistula in Ano", and left a chapter in manuscript on the subject, which was published by John Read in 1588.

The man who is credited with having accomplished most for the advancement of surgery during the sixteenth century, was Ambroise Paré, born at Laval, about 1510. He commenced his career as an apprentice to the provincial barber surgeons, but feeling the need of better training, at the age of 22 years, he went to Paris, and studied three years at the Hôtel Dieu. He made such progress as to gain the confidence and special commendation of his teachers, and in 1537 he was made surgeon to Colonel Réné de Montijean, and accompanied him in his first campaign in Italy. This campaign, which continued three years, furnished the opportunity that enabled him to make one of his most important improvements in practical surgery. Until his time, gun-shot wounds had been universally regarded as poisoned and burned by the penetrating ball or missile and burning powder, and were treated by pouring into them boiling oil or by the application of actual cautery, thereby adding immensely to the torture of the patients. Early in the progress of the campaign he found himself in charge of a large number of wounded soldiers, and his supply of boiling oil became exhaused with many wounds still without that dressing. After passing a sleepless night from anxiety he was surprised to find in the morning that the patients who had received no oil in their wounds had suffered much less and were in better condition than those to whose wounds it had been applied. This led him to reflection and further trials ending in his abandonment of the use of the boiling oil as a dressing, and also the doctrine that such wounds were necessarily either poisoned or burned.

After the close of this campaign, he returned to Paris and was married. In 1543 he again entered military service with the army, in the service of de Rohan, Lord of Brittany, during which he added much to his reputation by boldly resorting to the ligation of arteries for the arrest of hæmorrhage instead of the actual cautery. After his return from another active campaign he was appointed one of the twelve royal surgeons, and in 1554 he was elected fellow of the College de St. Como, against their rule re-

quiring a knowledge of Latin; for Paré never acquired a knowledge of the Latin language, but wrote all his works in the language of his own country—France. In 1545, he wrote his first notable work on the treatment of gun-shot and other wounds, and of burns by gun powder. It was a small volume in French, published by Gaulterot, the book-seller of the University of Paris, and soon brought about a most desirable revolution in the treatment of such wounds.

Subsequently he became surgeon to King Henry II., and directly after this monarch's death, in 1559, he occupied the same relation successively to Francis II., and to Charles IX.

In 1573 he caused to be published his important work entitled "Deux Livres de Chirurgie", in which is shown the work of a most active and practical mind, constantly striving to make such improvements as would lessen human suffering and prolong human life, and yet keeping nothing secret for private gain as was much the practice in his day. For during those centuries, many went from place to place claiming to have discovered some valuable elixir, or some special mode of operation, and called themselves Herniotomists, Lithotomists, etc., much like some of the perambulating specialists of the present day.

Paré, though rising from the humble condition of a poor barber surgeon's apprentice to that of chief surgeon of a kingdom, and the honored guest of many kings, ever remained true to his early maxim that: "He who becomes a surgeon for the sake of money, and not for the sake of knowledge, will accomplish nothing." He was not only ever seeking knowledge, but also persistently applying it in improving instruments and modes of operation, the correction of errors, and the abandonment of evil practices though sanctioned by all preceding authorities. Actuated by such motives and aided by Lanfranchi, of Milan; Maggi, of Bologna; Lange, of Germany, and others, he lived to see surgery fairly started on a career of independent professional recognition and progress. He died in 1590, aged about 80 years.

In close connection with the progress of anatomy and

surgery, during the sixteenth century, came the beginning of pathological anatomy.

During the last part of the fifteenth century Benivieni, of Florence, commenced searching for the seat and nature of diseases and the causes of death by post-mortem examinations of bodies, whenever practicable. The results of his work were published at Florence, in 1507, in a monograph with the title "Concerning Some of the Secret and Strange Causes of Disease"; in which he describes the gross pathological conditions found, and the chief symptoms with which they were connected during life. He was followed in the same field of investigation by Donatus, Grafenberg, Felix Patter, Fernel, Koyster, and others. The descriptions of changes found by the latter in the brain and spinal cord after death from delirium, convulsions and paralysis were remarkable for their minuteness and general accuracy. As the result of the investigations of this class of workers, extending through the whole of the sixteenth century, the profession was made acquainted with a great variety of morbid conditions in the internal structures and organs, resulting from diseases both acute and chronic.

Thus was laid the foundation of pathological anatomy by direct personal research, and not a few of the theoretical dogmas of the ancients were corrected and the way prepared for entering the field of physiology in the next century.

In the surgical part of midwifery the Cæsarean section and podalic version were revived and improved by Paré, Guillemeau and Rousset; and in the field of practical medicine the chief advancements were in the better recognition of syphilitic and gonorrheal affections; the use of mercurials externally and internally; the revival and more discriminating practice of venesection, especially in acute inflammatory diseases; and a marked increase of independent individual thought and practice.

The frequent recurrence of epidemics of the plague, small-pox and other diseases mentioned at the close of the preceding chapter, continued with little or no abatement through the fourteenth, fifteenth and sixteenth centuries;

to which were added during the last named century epidemic influenza, or la grippe, petechial or spotted typhus, and pleuro-pneumonia.

CHAPTER VI.

HISTORY OF PROGRESS IN THE DEVELOPMENT OF THE VARIOUS BRANCHES OF MEDICAL SCIENCE AND EDUCATION DURING THE SEVENTEENTH CENTURY A. D.

In the preceding chapter chief attention was given to the origin and development of the two fundamental branches of medical science, i. e., human anatomy and chemistry.

The three centuries of progress reviewed in that chapter constituted a transition period of great importance. It marked the emergence of the human mind from the domain of purely speculative fancies, called philosophy, and tenacious obedience to authority, to the actual study and collation of facts from which to deduce conclusions, and the institution of experimental tests instead of the dictum of authority. It is true the emergence was slow, and characterized by mental controversies as bitter and relentless as the coincident political contests and almost continuous wars that devastated the greater part of Europe.

When schools of medicine and of other branches of learning were re-established in Europe on the decline of the Arabian era they were still founded on essentially the same theoretical dogmas that had pervaded all the systems of Grecian and Roman philosophy. So persistent was this reverence for authority that when, at the commencement of the fourteenth century, Frederick II., King of Naples, required all who would practise medicine in his kingdom to be examined by the Faculty of Salernum, the works on which they were to be examined were those of Hippocrates, Galen and Avicenna. And a century later, when, under the leadership of such men as Nicholas Leonicenus, of Italy, and Thomas Linacre, of England, the study of Greek language and literature had been revived and the best classical authors had been translated into excellent Latin, the last named author, by the authority of King Henry VIII., was permitted to establish chairs of Hippocratic and Galenical Medicine in the Universities of Oxford and Cambridge,

and all medical writing and teaching was done in the Latin language. While this persistent submission to the dictum of authority, often sustained by the edicts of kings, popes, and ecclesiastical councils, was exhibited on one side; on the other was the inherent principle implanted in the human mind constantly prompting to independence of thought and action, aided by the fundamental doctrine of the Christian religion, i. e., man's individual responsibility to God, as promulgated by its divine author and his immediate followers. It was the promptings of the latter principles and doctrines that led such men as Mondino, Vesalius, and their followers, to study human anatomy in defiance of the highest human authority, when the only apparent benefits to accrue were the personal satisfaction always afforded by increased knowledge and the higher satisfaction of so applying it as to greatly benefit the living.

It was the same promptings that caused Geber, the Arabian, Basil Valentine and other monks, Paracelsus, and especially Libavius and Van Helmont, to so guide the zealous labors of the alchemists as to develop not only new chemical substances, but also a knowledge of the application of such substances in the treatment of disease. The persistence of authority in making Latin the language of medicine, both in writing and teaching, was rudely shocked by the rebellious course of Paracelsus in boldly writing and teaching in his native German; and its influence was still more effectually nullified by the quiet and dignified course of Ambroise Paré in his adherence to his native French throughout his long and successful career.

Renouard and other historical writers have designated the period intervening between the re-establishment of medical schools in Europe, and the end of the sixteenth century, as an "Age of Renovation." Perhaps it might be more properly called a protracted period of mental revolution, during which the human mind slowly but successfully emerged from its bonds of authority, both philosophical and ecclesiastical, and asserted its own right to independence of thought and of expression. And the seventeenth century, instead of being a period of reform (Renouard) was

only a continuance and increase of that independent spirit of investigation which had already begun to manifest itself among the students in every department of human knowledge. For it was during the last part of the sixteenth century that Copernicus, Kepler, Galileo, and their co-workers, laid the foundations for nearly all the modern physical and natural sciences. And during the seventeenth century their work was greatly extended by Swammerdam, Hooke, Malpighi, Sir Isaac Newton, Romer, James Gregory, and others.

Human investigations having thus fairly passed from the domain of closet speculation to the broader field of observation, verification by experiment, collection of facts, and logical deductions therefrom, greater advancement was made, not only in medicine but in all the collateral sciences, in a single century than in all the fifteen centuries preceding it.

Notwithstanding the marked advancements made in our knowledge of chemistry, descriptive anatomy, and even pathological anatomy during the sixteenth century, comparatively little progress was made in physiology, or a knowledge of the functions of the various structures and organs of the human body. Indeed such progress was not practicable so long as the arteries were supposed to carry only air or vital spirits, and the whole mechanism of the circulation of the blood was a profound mystery. It is true that in prosecuting the study of the anatomy of the heart and blood-vessels, Fabricius had described the valves in the veins, and Columbus those of the heart, and Michael Servetus and Cæsalpinus had explained the passage of the blood through the lungs, thereby paving the way for the discovery and complete demonstration of the circulation of the blood by William Harvey, early in the seventeenth century.

William Harvey was born at Folkestone, Kent, England, April 1, 1578. His primary education was in the grammar school of Canterbury, and at the age of fifteen he entered Cambridge. After completing his course in college he went to Padua, in 1599, where he pursued the

study of medicine five years, as the pupil of Fabricius ab Aquapendente and Casserio, and returned to England at the age of twenty-six years. Soon after his return he married the daughter of Dr. Lancelot Browne, and received his first official appointment as physician to St. Bartholomew's Hospital in London, in 1609, and as professor of Anatomy and Surgery in the College of Physicians, in 1615. He engaged actively in the practise of medicine in London, and annually lectured to a class of students in the College of Physicians, to whom he began to explain his views concerning the functions of the heart and the general circulation as early as 1616.

He continued his investigations several years longer, experimenting on both cold and warm blooded animals, during which time he found neither air nor "vital spirits" either in the arteries or any cavity of the heart. He did, however, clearly prove "that the blood passes through the lungs "and heart by the pulsation of the ventricles, and is sent "for distribution to all parts of the body, where it makes "its way into the veins and pores of the flesh, and then "flows by the veins from the circumference on every side to "the center, from the lesser to the greater veins, and is "by them finally discharged into the vena cava and right "auricle of the heart, and this in such quantity, or in such "a flux and reflux, thither by the arteries, hither by the "veins, as cannot possibly be supplied by the ingesta, and is "much greater than can be required for mere purposes of "nutrition; it is absolutely necessary to conclude that the "blood in the animal body is impelled in a circle." Having thus, with great patience and perseverance, solved the problem of the circulation, both pulmonary and systemic, and the true function of the heart, he gave a full account of his great discovery in his work entitled, "Exercitatio Anatomica de Mortu Cordis et Sanguinis in Animalibus", published at Frankfort-on-the-Main, 1628; the same having been rejected by the book publishers of London.

A second treatise on the same subject, written in reply to the criticisms of Riolan, of Paris, was published at Cambridge, in 1649. The announcement of a physiological

discovery of such paramount importance and so antagonistic to several of the most cherished doctrines of all the past centuries, did not fail to elicit prompt and severe criticism from almost every quarter. This, however, only impelled the more earnest of his opponents, both in England and on the Continent, to actively investigate the subject, and in doing so they were soon compelled to acknowledge the general correctness of his views and to cease their opposition.

Harvey was made physician extraordinary to King James I., after whose death he became physician in ordinary to Charles I., in 1632, and was a faithful adherent to that unfortunate monarch during the war between him and the English Parliament. As a member of the Court he was compelled to move from place to place, and on one occasion his house was seized and some valuable manuscripts were destroyed. He was present at the battle of Edgehill, after which he retired with the King to Oxford, where he was made Warden of Merton College and received the degree of M. D. He remained there until the surrender of the City to the Parliamentary forces, and during this time he resumed his studies and experimentation concerning the process of generation. A few years after his return to London he gave the results of his researches in a work entitled, "Exercitationes de Generatione Animalium", published at Cambridge, in 1651, in which he demonstrated that all animal generation proceeded from ova. The discovery of spermatozoa, however, has been credited to a German student, named Ludvig Von Hammen, at Leyden, in 1677.

On account of his adherence to the cause of the King, Harvey lost his position as physician to St. Bartholomew's Hospital, but retained his connection with the College of Physicians and his general practice in the city. Notwithstanding the severe criticisms of his great work, published in 1628, the opposition subsided as rapidly as verifying researches or tests could be instituted, and its correctness, together with that of his subsequent work on Generation, was so generally acknowledged, that in 1652, his statue was placed in the Hall of the College, with suitable inscriptions

in honor of his discoveries. Soon after this he built a valuable addition to the Hall and gave his paternal estate as an endowment, accompanied by the condition that annually an oration should be delivered in commemoration of the benefactors of the College, and containing an "exhortation to the members to study and search out the secrets of nature by way of experiment, and for the honor of the profession to continue mutually in love." In 1654 he was elected president of the College of Physicians, but on account of natural modesty and advanced age, he declined the office. He died in June, 1657, and was buried at Hempstead, in Essex. His works were written in excellent Latin, the best translation of which is that by Dr. R. Willis, published under the auspices of the Sydenham Society in 1847.

Marcello Malpighi, of Crevalnore, and professor in the University of Bologna, in 1661, with the aid of the microscope, discovered the movement of blood in the capillaries of the lungs and mesentery of frogs, and, in 1665, he described the corpuscles of the blood, the cutaneous glands and the pigmentary layer of the skin, which is still called the "rete Malpighii."

In 1683, William Molyneux, of Dublin, observed the capillary blood currents in the lizard; and in 1688 Anton Von Loeuwenhoeck commenced his microscopic studies on the larvæ and feet of frogs, by which he was enabled to describe the blood corpuscles, both red and white; while William Cowper saw the arterial blood pass into the veins. To demonstrate the capillaries as the connecting link between arteries and veins, Marchetti, of Padua, and subsequently Friedrich Ruzsch, of Amsterdam, succeeded in minutely injecting them, and thus completing the circuit of blood vessels that Harvey had declared must exist.

During the same period of time, the structure, position, and movements of the heart and lungs were studied by Nicholaus Steno, of Copenhagen, Joh. Jac. Harden, of Basel, Borrelli, and others, by whom the mechanism of respiration and the movements of the heart were more fully explained.

Following closely the great discovery of Harvey regard-

ing the circulation of the blood, was that of the existence and uses of lymphatic vessels and glands; not as the work of one man, but as the result of the work of many investigators. It is doubtless true that Herophilus and Erasistratus, in their study of comparative anatomy, mentioned seeing white vessels in the mesentery of animals, but they thought they were arteries filled with air. And though Galen claimed that the same vessels contained chyle from the intestine, he supposed they terminated in the liver. Caspar Aselli, of Paris, in 1622, while examining the chyliferous vessels in the mesentery of a dog soon after a full meal, opened one of them by accident, and saw the escape of a white fluid which he recognized as chyle from the intestine. On tracing the course of the vessels he discovered their valves, but thought they terminated in the pancreas.

Twenty-five years later (1647), Jean Picquet, at Montpellier, traced the lacteal vessels into the receptaculum chyli, and the thoracic duct to its termination in the left subclavian vein, into which its contents were discharged.

The discoveries of Aselli and Picquet were followed by those of George Jolyff, of Cambridge, in 1650; Jan Van Horne, of Leyden, in 1652, and others, until the whole lymphatic system and its connection with the general circulation was fairly well understood before the end of the seventeenth century.

While the foregoing investigations were actively progressing, the publication of Harvey's work on Generation, in 1651, did not fail to attract the attention of several investigators, chief among whom were Aubery, of Florence, Jan Van Horne, of Leyden, De Graaf, of Schoonhoven, and Walter Needham, in regard to the functions of the ovaries and the progress of the active development of the impregnated ovum and its appendages. Until the time of Harvey and his followers the ovaries had been described as female testicles. The discovery of spermatozoa in the male semen by Ludvig Von Hammen, (or Joh. Ham, as he has been named by some writers) and their examination by Leuwenhœck and others, first caused them to be regarded as the real germ of the new animal and endowed with an immor-

tal soul, while the ovum or egg of the female was looked upon as only consisting of food for the growth of the new being. But after much investigation, and no little controversy, the existence of a germinal cell in the ovum was demonstrated, and the co-operation of it with the spermatozoa of the semen in commencing the process of generation was fully recognized.

The investigations necessary for making plain the mechanism of respiration, circulation and generation, led to much additional knowledge of the anatomy of the liver, the pancreas, the mesenteric glands and the organs of generation. Glisson described the structure of the liver and its capsule that took his name. Anton Nuck first injected the lymphatics with quicksilver, and thereby demonstrated their connection with the whole system of lymphatic glands. Thomas Wharton, a professor in Oxford, in studying the glands, discovered the duct of the submaxillary which took his own name; and Stenson and Needham discovered the excretory duct of the parotid glands.

Johann Conrad Peyer, of Schaffhausen, and Joh. Conrad Brunner, of Regensburg, discovered the intestinal glands still known as the glands of Peyer and Brunner. The excretory duct of the pancreas was discovered by George Wirsung, of Bavaria, while acting as prosector for Vesalius, at Padua. The structure of the testicles, the seminal ducts and epididymis were well described by Nathaniel Highmore, of London; and Walter Needham claimed that the fœtus in utero was nourished by blood from the placenta, and he clearly described the fœtal and maternal parts of that organ. It was near the middle of the seventeenth century that Conrad Victor Schneider, of Saxony, discovered the existence and secretory function of the mucous membrane lining the nostrils, by which it became known as the Schneiderian membrane, and a final end was made of the ancient doctrine that discharges from the nostrils were humors percolating through the cribriform plate from the brain.

It was near the end of the century, when Vieussens, professor at Montpellier, who had previously made valuable

additions to the knowledge of the position and functions of the heart, gave a more complete description of the brain and central portions of the nervous system than had been given before; and Thomas Willis, of Oxford, ordinary physician to Charles II., first pointed out the separate parts of the brain and assigned distinct functions to each, and added much to the knowledge concerning its ganglia and blood vessels.

While the foregoing important discoveries in physiology and advancements in anatomy were developing, the science of chemistry, which had only begun to assume a scientific character during the sixteenth century, continued to progress. Joh. Rud. Glauber, a contemporary of Van Helmont, early in the seventeenth century, improved the processes for obtaining mineral acids and salts, and determined the composition of many substances by synthesis. Robert Boyle, a little later, by true inductive methods, showed that a substance could only be considered as elementary when it could no longer be separated into two or more constituents, and thereby effectually disproved the long entertained doctrine of the "four elements" of the ancients. He also discovered the elasticity of the air and invented the air pump. During the last part of the century Otto Tachanius, of Herford, made the first correct quantitive analysis by demonstrating that lead when converted into red oxide gained one-tenth in weight. About the same time Nicholas Lemery introduced the study of chemistry into Paris, and was the first to demonstrate the existence of iron in the blood.

J. J. Becher, of Speyer, Germany, professor at Ments, 1660, and imperial councillor at Vienna, published an important work to establish the close relation between chemistry and medical science in 1669. A prominent topic of discussion was that of combustion and oxidation, and it may be regarded as the first distinct treatise on chemistry as a branch of medicine.

Materia Medica: The marked progress in physiology and chemistry during the seventeenth century was accompanied by the use of a larger number of chemical prepara-

tions and some very important vegetables as remedies in the treatment of disease, and of the latter class, several as food. The chemical preparations were newly discovered alkalies, acids, and salts, the most important of which were tartar emetic, oxide of zinc, Glauber's salts, and preparations of mercury and arsenic.

Of the new vegetable remedies the most important were the cinchona bark and ipecacuanha. The first was originally introduced into Europe from South America, in 1640, by Juan del Vego, ordinary physician to the Count of Cinchon. It was called cinchona or "Countess' bark" in honor of the wife of the Count who had been cured of an attack of fever by the remedy.

It was obtained from the bark of several species of the cinchona tree, found chiefly in Peru, and consequently was later called Peruvian bark. Its use in Spain was favored by the Catholic clergy, and hence was often called "Jesuits'" bark. Its introduction and use in England was greatly promoted by Sydenham, while Robert Tabor, an apothecary of Cambridge, introduced it as a secret remedy into Paris, and after effecting the cure of the Dauphin, he sold the secret to the government of France for 2,000 Louis d'or. In Germany perhaps the first to use it were Peyer and Professor Valentini, of Giessen.

The first medical work to recommend the use of the cinchona was the Vera Praxis, of Pietro Barba, published at Seville, in 1642. For many years it was used chiefly in the form of powder, and acquired so much reputation as a remedy for the arrest of malarious fevers that it sometimes sold for its own weight in gold. (Henderson.)

Ipecacuanha is said to have been first described by Guillaume Le Pois, in 1648; and was introduced into general practice by Le Gras as a mild emetic and an efficient remedy for dystentery, in 1672. Potatoes first became a common article of food in Europe in the seventeenth century; and tea, coffee and chocolate, though known and used to some extent at an earlier period, rapidly gained wide popularity as articles of luxury at this time.

It was also during this seventeenth century that the

use of tobacco, for both smoking and chewing, increased so rapidly among all classes that several of the leading governments enacted very severe laws for its suppression.

During the middle part of the same century the first attempts to gain more accurate knowledge concerning the action of drugs by experiments on living animals were made by Wepfer, Brunner and Harder.

State Medicine or Medical Jurisprudence: This important department first began to attract special attention at the beginning of the seventeenth century. Fortunatus Fidelis, at Palermo, published his work, "De Relationibus Medicorum", in 1602; and Paolo Zacchias, ordinary physician to the Pope, published his work, "Questiones Medico-Legales", at Rome, in 1621. The latter work attracted much attention, and has been generally regarded as the primary basis of medico-legal science.

In 1637, the Royal College of Physicians of London presented to the City Council a "Report on all such annoyances as they conceive likely to increase the sickness of this Populous City." And Ludvig von Hœrnigk, of Mayence, in 1638, wrote a work "On the duties of the Medical Profession as a whole."

Swammerdam discovered the fact that human lung tissue that had been fully inflated by respiration would not afterwards sink in water, in 1667, and Malachias Thuiston immediately applied it as an important test for deciding whether a child had been born dead or had lived long enough to breathe. The conditions limiting the application of the test were pointed out by Hartmann, and it was first made available during the trial of a case in court by Joh. Schreyer in 1681. It is the well known hydrostatic test of modern works on medical jurisprudence.

The active progress in a knowledge of all the departments of physics and the natural sciences during the seventeenth century was intimately connected with the advancements in the elementary branches of medicine, as illustrated by the application of the microscope, in completing a knowledge of the circulation of the blood through the capillaries and of the corpuscular elements of the blood

itself, and by the application of physical laws in the invention of instruments and appliances of value in the practical branches of the healing art. The trochar for paracentesis abdominis and an ingenious self-injecting apparatus were invented by Sanctorius, of Padua. The tourniquet was invented by the French surgeon Morel during the siege of Besancon, in 1674. The obstetric forceps, one of the most important instruments in use, was invented by Peter Chamberlen, of London, early in the century, but were kept as a family secret many years for private gain. The use of the instrument was restricted to his sons and a few other persons, also pledged to continue the secret.

Notwithstanding the selfish and unjustifiable policy pursued by the Chamberlen family, the instrument became quite well known in England before the end of the century.

Surgery: The internicene and so-called "religious" wars that prevailed in Europe during the greater part of the seventeenth century, afforded a wide field for practical surgery, and the steady progress in anatomy and physiology greatly favored coincident progress in surgery in which the English and French took the lead. Perhaps the best representative of English surgery during that period was Richard Wiseman, ordinary surgeon to James I. and afterwards in the service of Charles I. and II., and James II. He had an extensive military experience, both in England and on the Continent, and finally settled in London, in 1652. He favored primary amputations, especially in gunshot injuries of the joints; preferred to operate through healthy tissues; treated aneurisms by compression; and used the ligature for the control of hæmorrhage, except on the field of battle, when he kept the actual cautery ready, because, he said, the ligature required too much time and too many assistants. He is credited with having been the first to accurately describe the white swelling under the name of "tumor albus." He established the indications of herniotomy more distinctly, and in his treatise "On the ill consequences of Gonorrhea", gave the first recorded case of external urethrotomy for stricture, as performed by Edward

Molins, in 1652. His most important work was entitled "Several Surgical Treatises", published in London, 1676.

Sir Christopher Wren, who was a learned architect as well as surgeon, in 1657, was one of the first to inject medicines into the veins, which was soon shown to have the same effect as when taken into the stomach. In France, Jean Baptiste Denis, physician of Louis XIV., aided by the surgeon Emmerez, performed the first transfusion of blood in man, on the 15th of June, 1667. Edward, King of England, repeated the operation November 23d, and Riva, in another case, in December of the same year.

In Germany perhaps no surgeon during this century was more distinguished for his learning, or exerted more influence in promoting closer relations between the physicians and surgeons, than Fabricius Hildanus, of Hilden. He, like many of the surgeons of that period, practised both ophthalmology and otology, and not a few also practised dentistry and obstetrics, with their general surgery.

Medicine: The effectual overthrow of the purely theoretical doctrines of the ancients founded on the four elements, four humors and their concoctions, and the vital spirits, by the actual development of chemistry, anatomy, physiology and pathological anatomy, in close connection with the rapid progress in all the collateral sciences during the sixteenth and early part of the seventeenth centuries, led to many attempts to construct new systems or theories of diseases and their treatment, based on some one of the recently developed sciences. Thus Van Helmont, at the beginning of the last-named century, endeavored to create a system of medicine by uniting the alchemistic doctrines of Paracelsus with his own Archeus or dynamic force. This was soon superseded by the Iatro-chemical system, founded by Francois de la Boe or Sylvius, of Leyden, and Thomas Willis, of Oxford. They attributed diseases chiefly to changes in the saliva, pancreatic juice, and bile, or to fermentation in the blood, and endeavored to explain all the phenomena of both health and disease on chemical principles.

Somewhat in contrast with this, was the Iatro-Physical

system, the ablest supporter of which was Sanctorius, a practitioner of Venice and professor at Padua. He prosecuted investigations concerning the insensible transpirations from the skin, the excretion by the kidney, the evacuations from the bowels, and the variations of temperature of the body and of the pulse by the aid of instruments of his own invention, with a perseverance and success but little less creditable than those prosecuted by Harvey regarding the circulation of the blood. Both the Iatro-Chemists and the Iatro-Physicists retained in their system much of the humoralism of preceding ages. But the Iatro-Mathematical system, founded by Giovanni Alfonzi Borelli, of Naples, was one of solidism. Borelli and co-workers sought to explain muscular action, circulation, secretion, and both physiological and pathological processes generally on purely mathematical and mechanical principles. They endeavored to explain movements produced by muscular action on the principle of the lever, and computed mathematically the amount of force employed. Thus Borelli estimated the force of the heart's action to be equal to 1,500 kilograms per minute, while others figured it at only a few ounces.

While these various attempts to construct theoretical systems of medicine founded on the coincident advancements in general science were in progress, the greater number of active practitioners, led by Sydenham, were making greater and better progress by a return to the Hippocratic method of patiently observing facts and deducing practical conclusions from them.

Thomas Sydenham was born at Winford Eagle, in Dorsetshire, in 1624, and died in London, 1689. He entered Magdalen College, University of Oxford, in 1642, but was soon interrupted by enlistment in the Parliamentary Army, in which he held the office of captain; thus placing him in political antagonism to Harvey who was on the side of the King. He re-entered Oxford in 1645, and took his Baccalaureate degree in 1648. Subsequently he pursued medical studies at Montpellier for a considerable time, and finally took the doctor's degree at Cambridge, was admitted to membership in the Royal College of Physicians of

London, and settled in Westminster, London, in 1663. His most important medical work was entitled "Observationes Medica", published in 1666. He early adopted Hippocrates as his model, and discarding all attempts to construct theories or systems of medicine, and adopting the Hippocratic doctrine that disease is a more or less active effort of the natural functions to free the system from disturbing influences, he insisted that these efforts of nature were the chief agents for effecting cures. Consequently he insisted that the chief business of the physician is to observe carefully the conditions and circumstances under which diseases arise, and with equal care to note their symptoms, progress and terminations, that he may adopt rational methods for obviating the first, and such dietetic and therapeutic measures as would assist the natural tendencies towards a cure.

He regarded "inflammation of the blood" as the chief pathological condition in acute febrile affections, and often resorted to venesection, cathartics, diaphoretics, cool drinks, and, in the latter stages, more nourishment and tonics, especially the cinchona bark, which he aided much in gaining a favorable introduction to the profession generally. By his strenuous defence of the "healing powers of nature", and his intelligent adherence to the study of facts and the phenomena of disease, through the more than forty years of his professional life, he wielded a greater influence, and did more to advance the real interests of practical medicine, than any other practitioner of the same century.

For some needed comments on the social status of the profession, the conditions of the medical schools, and the prevalence of epidemics during this century, I must refer to the first part of the next chapter.

CHAPTER VII.

THE SOCIAL STATUS OF THE PROFESSION; THE PROGRESS OF THE MEDICAL COLLEGES, AND THE CHARACTER OF EPIDEMICS DURING THE SEVENTEENTH CENTURY; CONTINUED PROGRESS OF CHEMISTRY AND PHYSICS, AND THEIR CONNECTION WITH THE PROGRESS OF MEDICINE DURING THE EIGHTEENTH CENTURY; ALSO ADVANCEMENTS IN PHYSIOLOGY AND IN GENERAL AND PATHOLOGICAL ANATOMY, TO THE END OF THE EIGHTEENTH CENTURY.

The social condition of the medical profession during the seventeenth century was characterized by marked improvement in its education, its stability and greater unity of purpose, and in its influence in directing the sanitary interests of the people. In proportion as chemistry, anatomy, physiology, and pathological anatomy developed from observation, experiment, and induction, in direct connection with the similar advancement of physics and all branches of the natural sciences, in the same proportion did the practitioners of both medicine and surgery cease to be itinerant or traveling specialists. From the re-establishment of medical schools and other institutions of learning in Europe on the decline of the Arabian era, to the commencement of the sixteenth century, a large proportion of the medical practitioners traveled from place to place, and often from one country to another, claiming either superior skill in the performance of important operations, or the possession of remedies of unusual efficacy in the treatment of diseases. Even the professors in the colleges seldom remained in the same institution many years. Thus we find Vesalius, the anatomist, teaching successively in Padua, Pisa, Louvain and Basil; and the attendance of students was still more variable.

It is claimed by Baas and other historical writers that a large proportion of the students were not only of a roving and reckless character, changing from one school to another without let or hindrance, but often committing depre-

dations upon the rights and property of others. It was during these medieval centuries, that students organized themselves into bands or social clubs, with badges, mottoes, and sometimes peculiarities of dress. It was during this same period of time that senior classes assumed the most cruel and arbitrary control over their juniors or freshmen, and exacted from them the most menial service. Unfortunately these barbarous and wholly unjustifiable student practices are not yet entirely absent from the colleges and universities of our own time, as the records of "hazing" and initiatory exercises of secret societies annually show.

During the sixteenth century the Italian Schools began to lose their prestige as those of Germany, France and England advanced. This change became still more prominent during the seventeenth century, when those of Paris, Montpellier, Berlin, Leyden, Heidelberg and Edinburgh had become the chief centers for medical education in Europe.

The final introduction of their study of descriptive anatomy by dissections of the human body in all the important medical schools during this century, coupled with the fact that the chief teachers of anatomy were at the same time most prominent as surgeons, aided very much to bring the physicians and surgeons together, both in education and in practice. Coincidently with this came the protracted and relentless religious, or more properly, ecclesiastical, wars that devastated Europe for thirty years, and resulted in effectually destroying the dominating influence of priests and ecclesiastics over medicine and medical institutions, and thereby removed one of the obstacles to the union of physicians and surgeons as one profession. While the College de Comé was doing much to elevate the character of surgery in France and to separate it from the "barber shop", an equally active influence was being exerted in England by the incorporation of the barber-surgeons in London noticed in a previous chapter. In 1512 a new charter was granted which forbade any person from practising surgery in London except the members of that corporation. In 1540 another act was passed forbidding the barbers who practised shaving and hair dressing from doing any surgical

work except the extraction of teeth. On the other hand, the surgeons were forbidden to practise shaving. The final legal separation of the surgeons and barbers did not take place until 1745, when an act was passed making the College of Surgeons and the Corporation of Barbers entirely separate bodies and limiting the practise of surgery wholly to the membership of Colleges of Surgeons, Physicians and Apothecaries.

The Act of Incorporation of the College of Physicians, London, was granted in 1518 during the reign of Henry VIII., chiefly through the influence of Thomas Linacre and John Chambers, both physicians to the king. It restricted the privilege of practising medicine in the city of London, or within seven miles of it, to the members of said College. Until this time medical practitioners were required to produce a license from either the bishop of London or the dean of St. Paul's.

It was also during the seventeenth century that several scientific societies were organized, having both a direct and indirect influence on the medical profession. In London the "Invisible Society", at first a secret organization, was founded by Milton and Hartleib, in 1645, but publicly reorganized into the Royal Society of London for the promotion of the Sciences in 1662.

In France the "Academie des Sciences" was founded by Colbert, in 1665; and at Schweinfurt, Germany, in 1652, was founded the "Gesellschaft naturforschender Aerzte" which was reorganized in 1677, and is still doing good work.

These and other scientific and literary societies received many papers, bearing more or less on the progress of medicine, which were published in their transactions, and among their most active supporters were the more eminent members of the medical profession in each country.

By the co-operation of all the foregoing influences, during the seventeenth century all the departments of medicine advanced; the medical schools and their faculties became more stable and better organized; the departments of medicine, surgery, and midwifery acquired greater unity

as one profession; a much larger proportion of the active practitioners selected permanent locations or fields for practice, while the services of a large number were constantly required in the armies, and in municipal and government offices. Still there remained both within and without the profession, an abundance of ignorance, bigotry, prejudice and exhibitions of vice and folly in all the countries.

Epidemics: All the epidemic diseases mentioned in preceding chapters continued to recur during this century with little or no abatement of their malignancy. During the "Thirty Years' War," in the first half of the century, epidemics of typhus and typhoid fever, dysentery, and typhoid pneumonia, were of frequent occurrence and very fatal.

From 1657 to 1685 malarious fevers several times appeared in a highly malignant and pandemic form, but most severe in England and the Netherlands. Both King James I. and Oliver Cromwell are reported as having died of the ague. In their time the soil around London, in Cambridgeshire and Lincolnshire, was neither drained nor cultivated. The plague also prevailed in London in 1603 to 1608, in Ireland in 1650, and again in London in 1665, when it is reported to have destroyed 69,000 lives. It repeatedly appeared in different parts of France, Germany and Italy. In Milan, where it is said to have destroyed 180,000 lives, its prevalence was attributed to a "Plague Salve" supposed to have been rubbed on the walls of houses by a barber named Mord and the health officer Piazza, who were tried, condemned, cruelly tortured, and then burned to death.

Limited epidemics of small-pox, scarlet fever, diphtheria and influenza also prevailed at different times both in Europe and America. Cases of undoubted malignant diphtheria occurred in Roxbury, Mass., as early as 1659, when four children of one family died from what was styled "Bladders in the windpipe." But the first full account of a severe epidemic of the disease in America was

published by Dr. Wm. Douglass, of Boston, Mass., in 1736, under the name of "Angina Ulcusculoso."

Clinical Instruction: The chief attempts to illustrate the progress of disease and the effects of treatment at the bed-side, or true clinical instruction, were made by Dr. William, of Utrecht, in 1636, Dr. Albert Kyper, at Leyden, in 1648, and still more successfully by Sylvius, of Leyden, in 1658. But that important method of instruction was not permanently established until the time of Herman Boerhaave, of Leyden, at the beginning of the eighteenth century.

Herman Boerhaave was born in 1668, at Voorhout near Leyden, the son of a clergyman, and was educated for the same calling as his father. After studying thoroughly philosophy, history, metaphysics, philology, mathematics and theology, he changed his purposes and with equal zeal studied chemistry, botany, and all other branches of medicine as the pupil of Drelincourt and Nuck. He graduated in medicine in 1693, and commenced practice in Leyden. In 1709 he was elected to the chair of Botany, and five years later, on the death of Bidloe, he was given the chair of Practice of Medicine, and in 1718 he acquired also the professorship of Chemistry, in which he gained a very high reputation. From the commencement of his teaching practical medicine, in 1714, he freely connected therewith direct clinical instruction, lecturing extempore with such success that he soon attracted the attention of both patients and students in numbers greater than the hospital and college rooms could accommodate. He persistently avoided attempts to construct any theoretical system of medicine; placed great reliance on the curative powers of nature; and insisted that observation and experience at the bed-side of the sick were the safest guides in the treatment of diseases. He was probably the first to give separate lectures on ophthalmology, and to use a magnifying glass in examining the eye. He also measured the temperature of his patients by applying the thermometer in the axilla.

During the last quarter of the seventeenth century

Nicholas Lemery, of Paris, Becher, of Mayence, George Ernst Stahl, of Halle, and Herman Boerhaave, of Leyden, began active investigations in chemistry. Becher contended that all metals and combustible bodies were composed of three varieties of earth, i. e., the fusible, combustible and mercurial. Stahl accepted the doctrine of Becher, but called his combustible earth phlogiston, the substance supposed to be expelled during the progress of combustion or oxidation and evolvement of heat. The residue left after the expulsion of the supposed phlogiston was regarded as the true elementary body. Boerhaave, without disputing the chemical doctrines of Becher and Stahl, determined to subject the transmutation pretentions of the Alchemists to a crucial test. For that purpose he kept one specimen of mercury moderately hot for fifteen years, another very hot six months, and distilled a third specimen five hundred times; yet all the specimens were only mercury still.

He was perhaps the first to declare the affinity of heterogeneous bodies with the suggestion of some definite law regulating their combination; and the text-book published by him aided much in promoting correct methods of studying chemistry.

As a man of great erudition, close observation and logical reasoning, he had few equals among contemporaries; and as a general practitioner and teacher of medicine he gained a wider reputation and more influence than any other physician of the eighteenth century. His advice was sought by all classes of people, from those highest in authority to the common laborer, and he insisted on giving each his turn, regardless of rank or wealth. He died in 1738 at the age of seventy years, leaving a large fortune.

The true nature of combustion and oxidation processes were not understood until the discovery of oxygen gas as an elementary body by K. W. Scheele and Joseph Priestley, in 1774, and the demonstration that atmospheric air was composed of a definite mixture of oxygen and nitrogen by Lavoisier; and that in combustion the oxygen was added to the combustible body, increasing its weight, in-

stead of the separation of phlogiston as previously taught by Stahl.

In 1781 water was shown to be a compound body consisting of hydrogen and oxygen, as demonstrated by Henry Cavendish and James Watt. During this period arsenic and cobalt were proved to be simple bodies by Brandt; chlorine and fluorine, by Scheele; platinum and molybdenum, by Wood; chromium, by Vauquelin; nickel, by Cronstedt; uranium and zirconium, by Klaproth; and the first medico-chemical work was done in analysing organic substances, such as milk, chyle, bile, and other secretions, by Antoine Francois de Fourcroy.

While these rapid advances were being made in chemistry, all having more or less bearing on medicine, equally rapid progress was being made in the departments of physics and the other natural sciences; including the discovery of electricity and magnetism, by Galvani, Volta, Count Rumford and others, and the identity of electricity with lightning, by Benjamin Franklin.

Near the close of the eighteenth century both chemistry and physics and their relations to medicine, were still further advanced by the investigations of Wentzel and Richter, who proposed the theory of chemical equivalents; Dalton, author of the Atomic theory; Guy Lussac; Sir Humphrey Davy; Thenard; Berzelius; Faraday and others.

Physiology: The investigations of William Harvey explaining the circulation of the blood and the animal generation from ova, and the work of his contemporaries and followers in establishing a more complete knowledge of lacteals, lymphatics and capillary vessels and their connection with the general circulation, during the last part of the seventeenth century, prepared the way for the equally important work of Albert von Haller, of Berne, Switzerland, in the field of physiological science.

Haller was born in Berne, in 1708, and at the age of fifteen years he entered the University of Tubingen. Two years later, 1725, he went to Leyden to study medicine under Boerhaave and Albinus, and received the degree of M. D. at the age of nineteen years. He then visited

London, Paris and Basil, actively prosecuting investigations in anatomy, physiology, botany and mathematics, and then returned to his native city to practise his profession. In 1734, at the age of twenty-six years, he was appointed director of the Hospital and professor of Anatomy, and soon established an anatomical theater in which to prosecute his investigations. In 1736 he was called to Göttingen as professor of anatomy, surgery, chemistry and botany, and there became the founder of the Botanical Garden, Anatomical Theater and a Hall of Anatomical Drawing. He was also one of the chief founders of Konigliche Gesellschaft der Wissenschaften, of which he was the first and only president until his death. In 1739 he was appointed English Physician-in-ordinary; and in 1749 made English State Councillor, while he had been received into the Council of his native city, in which he served until chosen Landermann of the Canton. All these more public duties did not deter him from the active and persistent prosecution of physiological and scientific investigations. His work on physiology was published in 1747, and an account of his researches on Irritability in 1752, and subsequently his most noted work the Bibliothecæ. Haller is said to have executed more than five hundred experiments in establishing the existence of irritability as a property of living muscular structure, imparting to it the capacity to contract independent of nerves, and entirely distinct from sensibility, that being restricted to nerve tissue alone. In prosecuting these numerous experiments he added many new items to our knowledge of the anatomy of the brain, heart, kidneys and sexual organs and their appendages. It is true that Glisson, the successor of Harvey in the professorship of Anatomy and Surgery in the College of Physicians, about the middle of the seventeenth century, taught a doctrine of irritability deduced from the fact that all living structures were undergoing constant metabolic changes or movements in response to the presence of excitors or stimuli. But the word susceptibility, meaning the capability of being acted upon or excited to action, would better express the idea of Glisson. The irritability de-

scribed by Haller as distinct from nerve sensibility and limited to muscular structures only, evidently included the capacity to contract, and might have been better indicated by the word contractility, especially as he regarded it as the cause of muscular movements.

The doctrine of irritability, as taugh by Haller and his numerous experimental investigations, led to a very general study of the physiological question suggested thereby, by all the leading minds in the profession. Many construed the doctrine as an elementary property belonging to all living organized structures in accordance with the expression of Glisson; others gave it the more limited range of belonging to fibrous or muscular structures only, as viewed by Haller; and still others continued to regard it as a manifestation of nerve sensibility under the leadership of William Cullen, of Edinburgh. All, however, were speedily led to abandon the last remnants of the humoral doctrines of the ancients, together with the vis anima of Stahl and the vital ether of Hoffmann, and to adopt an exclusive solidism both in physiology and pathology.

In applying the doctrine of irritability to the study of embryology, Haller and his more direct followers agreed with Harvey that the germinal cell of the ovum contained in itself the minute points of all parts of the future mature animal; and that the process of generation was one of simple evolution or growth from previously existing embryonic matter in the germinal cell of the ovum.

On the other hand, Caspar F. Wolff, of St. Petersburg, one of the earliest of the noted Russian investigators, revived the ancient theory of epigenesis, i. e., that the process of generation was an actual new creation. He was also the first to claim that tissue cells contain no true cavities within.

A little later the doctrine of a "nisus formativus", or inherent impulse of the impregnated germ to preserve and perpetuate from generation to generation its own form and species, was promulgated by the eminent anthropological investigator, J. F. Blumenbach, of Gotha, and professor in Göttingen. He was also the founder of modern

anthropology and made a remarkable collection of skulls, both human and comparative, called his "Golgotha."

For nearly fifty years, commencing 1721, Bernhard F. Albinus taught anatomy in the school at Leyden. Aided by the artists Wandelaar and Ladmiral he published fairly accurate descriptions of nearly all parts of the human body, illustrated by admirably colored plates. He was perhaps the first to demonstrate by injections the actual vascular connection between the mother and the fœtus through the placenta.

During the last part of the eighteenth century those who most successfully advanced the departments of anatomy, physiology and pathology beside those already mentioned, were Sommerring, of Mayence, and Cassel; William and John Hunter and John Bell, of London; G. B. Morgagni, of Forti, Italy; and M. F. X. Bichat, of Paris.

Morgagni became a professor in Padua in 1715, and for many years industriously pursued the study of pathological anatomy, including the changes and products developed in the progress of a large number of the most common diseases. He published his great work on Pathological Anatomy, consisting of five books or volumes, in Venice in 1761, which justly entitles him to the honor of being the founder of that branch of medical science.

William Hunter was born in Long Calderwood, Scotland, and was first educated for the ministry, but subsequently turned his attention to medicine and became a pupil of Cullen, in Edinburgh. He went to London in 1741, and commenced lecturing on Anatomy and Surgery in 1746. He rapidly acquired a high reputation and extensive practice in both surgery and midwifery. He devoted much attention to pathological anatomy, and is said to have spent half a million dollars on his house, library, and collection of normal and pathological anatomy. The latter have been well preserved and now constitute the Hunterian Museum of the University of Glasgow.

His most important works were entitled "Medical

Commentaries", published in 1764, and the "Anatomia Humani Uteri Gravidi" in 1774. He died in 1783.

John Hunter, a younger brother of William, was born in 1728 and died in 1793. He commenced work as a ship-carpenter, but in a few years he changed that for the study of medicine as the pupil of his brother William and of Cheselden and Pott, of London; and commenced the practise of surgery in the last named city in 1763. Five years later he became surgeon to St. George's Hospital, in 1776 surgeon extraordinary to the King, and in 1790 he was surgeon general of the English Armies. Though his rapid and high official advancement were thus in the line of surgery, he was an untiring and successful investigator in the departments of anatomy, both normal and pathological, human and comparative, and in several of the natural sciences. He investigated experimentally pathological conditions of the blood in inflammation; was the first to describe phlebitis; the different forms of chancre in syphilis, and the constitutional conditions following. His collection of anatomical and pathological specimens were purchased by the government for $75,000 and given to the College of Surgeons, and still constitute a large part of the Hunterian Museum in London. His most valuable publications were "On Venereal Disease", "On the Blood, Inflammation and Gunshot Wounds", and "On the Natural History of Human Teeth".

The closing years of the eighteenth century were rendered notable by the climax reached in the development of anatomical knowledge during the brilliant though brief career of M. F. X. Bichat, the creator of the department of General Anatomy. He was born in Thoirette, France, in 1771, the son of a physician, and commenced his education at Nantes. He prosecuted his medical studies at Lyons and Montpellier, and subsequently became a pupil and an assistant of the eminent surgeon Desault in Paris. He developed an extraordinary degree of mental activity and some original methods of investigation especially in normal and pathological anatomy.

After the death of Desault in 1795 Bichat lectured on

surgery and after 1797 he added private courses on anatomy. He founded the Société d'Emulation; was appointed to the Hotel Dieu in 1801, and died the following year from pulmonary tuberculosis, aged only thirty-one years. Yet during the eleven years of his professional career he wrote no less than nine important volumes, the most valued of which were, a Treatise on Membranes in 1800; one on General Anatomy in 1801; and one on Pathological Anatomy, which was published several years after his death. In addition to the ordinary methods of dissection in the study of anatomy he not only studied each membrane, but traced each organized structure wherever it was to be found both in its healthy and diseased conditions. In doing this he is said to have examined seven hundred bodies during a single winter. The results are to be found in his two remarkable volumes on General and Pathological Anatomy. He described twenty-one distinct simple tissues which by their combinations constitute the different organs and parts of the body as recognized in ordinary descriptive anatomy. He not only showed that each primary or simple structure retained the same properties or functions wherever found, but was also subject to the same morbid processes or diseases.

In thus prosecuting his study of anatomy analytically, according to the tissues, both healthy and diseased, Bichat rendered much aid in diagnosis and prepared the way for the brilliant developments in morbid anatomy and differential diagnosis by the French School of the first half of the nineteenth century. He was perhaps the first to demonstrate that the acute morbid condition called peripneumonia, was capable of being resolved into a pleurisy, a pneumonia, or a bronchitis, according to the tissues involved, and each presenting reliable diagnostic symptoms. He strenuously insisted that the actual study of the pathological conditions in internal organs, by post-mortem examinations and comparing them with the symptoms before death, was essential for the establishment of correct methods of diagnosis. He did much to check the purely theoretic tendencies of the profession, and to promote

the careful observation of facts and their comparison as affording the chief basis for legitimate deductions.

Probably there is the name of no other member of the profession on the pages of Medical History, who accomplished as much valuable scientific work in the brief period of eleven years, as was done by Bichat in the closing years of the eighteenth century. In 1857 a monument was erected to his memory in the Ecole de Medicine at Paris.

A review of the more important advancements in the strictly practical branches—surgery, midwifery, practical medicine, and public hygiene or preventive medicine, during the eighteenth century, is considered in the next chapter.

CHAPTER VIII.

THE HISTORY OF MEDICINE DURING THE EIGHTEENTH CENTURY CONTINUED. THE PROGRESS OF SURGERY, MIDWIFERY, PRACTICE OF MEDICINE, AND HYGIENE OR PREVENTIVE MEDICINE.

The numerous and important advancements made in the departments of physics, chemistry, physiology, and anatomy, both normal and pathological, during the eighteenth century, as shown in the preceding chapter, were accompanied by corresponding progress in all the more practical branches of medicine.

SURGERY: As nearly all those who were active and successful investigators and teachers of anatomy were at the same time active practitioners of surgery, the latter could not fail to profit more or less by each advance in the former. Early in the century, William Cheselden, who was born in Leicestershire, England, in 1688, commenced lecturing on anatomy and surgery in 1710, and soon acquired a high reputation and an extensive surgical practice. He was perhaps the first to make an artificial pupil by incision of the iris with a needle introduced through the sclera. He was noted for unusual dexterity in operating, especially for the removal of calculi from the urinary bladder. In performing the operation of lithotomy he preferred the lateral section, which, it is claimed, he performed in fifty-four seconds of time. His work on the "Anatomy of the Human Body" was published in 1713; a "Treatise on the High Operation for Stone" in 1723, and a more noted work on "Osteology, or the Anatomy of the Bones" in 1733. He was surgeon to St. Thomas's and Chelsea Hospitals, and chief surgeon to Queen Caroline.

Samuel Sharp, of London, a pupil of Cheselden and a surgeon of Guy's Hospital, also gained a high reputation both as an oculist and general surgeon. Alexander Monro Sen, of Edinburgh, born in 1697, became professor of both Anatomy and Surgery, and by his industry and skill

he added much to the reputation of the Edinburgh Medical School.

Charles White, a surgeon of Manchester, was the pioneer of conservative surgery. He first resected the humerus leaving the periosteum, and thereby gained a complete regeneration of the bone, in 1768. Wainman and Shripton had successfully exsected the elbow joint in 1758. Charles White demonstrated the practicability of resecting the hip joint on the cadaver, and he was the first to practise the reduction of dislocation of the shoulder by placing the heel in the axilla.

Percival Pott, of London, born in 1713, and surgeon to St. Bartholomew's Hospital from 1769 to 1787, did much for the better treatment of diseases of the spine and chronic diseases of the joints generally. He wrote a valuable essay on the Diseases and Deformities of the Spinal Column, which caused the angular spinal curvatures to be called "Pott's Disease." His complete surgical works were published in London in 1771.

(The eminent character and valuable works of the Hunters, William and John, were mentioned in the preceding chapter in connection with the subjects of normal and pathological anatomy.)

Benjamin and John Bell, of Edinburgh, were both eminent practitioners and teachers of surgery during the last part of the eighteenth century. The first gave much attention to the treatment of fractures and dislocations, white swellings of the joints, and ulcers. He wrote a voluminous System of Surgery, published in Edinburgh, in six volumes, 1783-87.

Thomas Bayford established the correct diagnosis between the contagions of gonorrhœa and syphilis; and Richard Bayley, of New York City, successfully disarticulated the shoulder joint in 1782.

Many of the English surgeons practised also extensively as oculists, dentists and obstetricians.

In France, more than in any other country during the eighteenth century, greater advancements were made, both in surgical practice and in the relative rank of surgical

practitioners, than during any other equal period of time. The "Academie de Chirurgie" was founded in 1731, chiefly through the influence of Marechal and Francois Gigot de La Peyronie. The latter devoted both his time and his fortune in sustaining the interests of his favorite department. He was not only an active director of the Academie de Chirurgie, but he secured the establishment of several professorships of Surgery, both in Paris and Montpellier. He was surgeon to the King, and in 1743 he completed the separation of surgeons from the barbers; and at his death in 1747, he, by will, devoted the greater part of his remaining estate to the further advancement of the same professional objects for which he labored faithfully during life.

Contemporary with Peyronie, and more famous as a practitioner and teacher of all parts of surgery, was Jean Louis Petit, of Paris, born in 1674 and died in 1750. He was one of the early Directors of the Academie de Chirurgie; improved several surgical instruments; practised herniotomy without opening the sac; and acquired a very high reputation in both civil and military surgery.

Later in the century Pierre Joseph Desault became the leading surgeon in Paris. He was the son of a farmer, born in 1744, and obliged to support himself by teaching while pursuing his medical studies in Paris. After commencing practice he acquired reputation rapidly, became professor and chief surgeon to the Hotel Dieu, in which he established its first surgical clinic. He gave special attention to the study of surgical anatomy and improved many surgical operations and instruments. In dressing wounds, he not only insisted on thorough cleanliness, but also such closure as to favor permanent union by first intention or direct adhesion without suppuration.

Many of the most enterprising surgeons in France, like those of England, gave no little attention to ophthalmology, otology and dentistry. The first formal work on the last named branch was written by Pierre Fauchard, of Paris, entitled "Le Chirurgien Dentiste, ou Traité des Dens", published in 1728.

The first catheterization of the Eustachian tubes ap-

pears to have been accomplished by Archibald Cleland, an English surgeon, in 1741.

Surgery advanced much less rapidly in Germany and Austria than in England and France. During the first half of the century Lorenz Heister, of Frankfort-on-the-Main, was the most noted surgeon of Germany and author of valuable works on anatomy and surgery. He was the first in that country to teach that cataract was caused by opacity or cloudiness of the lens.

In the last half of the century August Gottlieb Richter, of Zörbig, gained a high reputation as a surgeon and as a professor in Göttingen. Though a general surgeon he devoted much attention to diseases of the eye, and to improvements in operative procedures.

During the same period of time George Jos. Beer, a professor in the Vienna University, gained a still higher reputation in the department of ophthalmology, on which he gave separate lectures, thereby adding much to the reputation of the Vienna school. He divided inflammatory affections of the eye into idiopathic and those excited by local irritants or by sympathy, and studied the pathological changes taking place during their progress. He also made important improvements in the operations for cataract and the formation of artificial pupils.

J. Andr. Venel, of Orbe, Switzerland, was a pioneer orthopedist, who gained considerable reputation for the treatment of club foot and crooked joints.

It is thus seen that throughout the eighteenth century, surgery in all its departments made steady advancement, pari passu, with the progress of descriptive, general and pathological anatomy; and chiefly by the same individual members of the profession. Its separation from the "barber shop" and the domination of ecclesiastics, that had fairly commenced in the seventeenth century, was fully completed during the eighteenth by the establishment of well sustained chairs of surgery in all the medical schools, both in Europe and America, and the admission of surgeons to equal professional and social standing with general practitioners of the healing art.

Midwifery: As during all the earlier centuries surgery was compelled to remain in the hands of the barbers, so midwifery was equally confined to the management of uneducated midwives or menial servants; and if help was called for resort was had to the surgeon rather than to the physician, for the reason that the assistance required generally involved mechanical or operative procedures in aid of deliveries. Consequently, as stated in previous chapters, the Cæsarean section was early resorted to, and instruments were invented and used for effecting craniotomy and the extraction of the child in pieces. But, as has been previous stated, the invention of the obstetric forceps, by which deliveries could be effected generally without injury to the mother or child, did not occur until the early part of the seventeenth century, and then the inventor, Peter Chamberlen, a member of the Guild of Barber Surgeons of London, and his descendants, kept a knowledge of the invention so far a secret, for purpose of private gain, that it became known to, and used by, only a limited number of members of the profession, even in England, until the beginning of the eighteenth century. In fact, so little was known on the continent concerning the Chamberlen invention that Jean Palfyn invented an instrument for the same purpose, which he exhibited to the Paris Academie des Sciences in 1721. Though called obstetric forceps or "Palfyn's hand", it was composed of three blades without fenestra or lock, and consequently was incapable of efficient use until improved by Ducé of Paris in 1735.

Just prior to this latter date, however, full descriptions of the Chamberlen forceps were published by both William Gifford and Edmund Chapman, of London, the latter having used them in his practice more than ten years. By these publications, aided by those of William Smellie, of London, a few years later, the instrument soon became known to the profession both in Europe and America. Its form and methods of use were much improved by the last named writer, whose valuable "Treatise on the Theory and Practice of Midwifery" was published in 1752. He

also directed attention to the several conjugate diameters of the pelvis, and gave practical directions for effecting cephalic version and versions by the breech. The improvements effected by Smellie and his strong recommendation of the use of instruments in many cases of natural labor, led not only to the rapid introduction of his forceps into general use, but caused it to be used in many cases needing no such aid. This abuse, however, was effectually checked by the decided opposition of William Hunter, eminent both as a surgeon and obstetrician. He was followed on the same conservative line by Thomas Denman, whose work entitled "Introduction to the Practice of Midwifery" was published in London, 1787. He described more fully the mechanism of natural labors; the conditions justifying versions; and those requiring the use of the forceps. In cases of known great contraction of the pelvis, he recommended the induction of premature labor instead of the Cæsarean section at the full period. In 1736, Sir Richard Manningham established the first private lying-in asylum in London.

Andre Levret, of Paris, contemporary with Smellie and William Hunter, of London, was perhaps the most eminent teacher and practitioner of midwifery on the contient during the middle part of the eighteenth century. His teaching was characterized by good judgment, free from extravagances and attracted pupils from all the neighboring countries. In cases of placenta previa, he advised detaching it from the edge, rather than penetrating directly through it. His most important work was a Treatise on Accouchement, published in 1753.

Later, Jean Louis Baudelocque, of the same city, became a leader in the department of obstetrics, and opposed the recommendation of Denman to procure premature labor in cases of great contraction of the pelvis. He also invented an external pelvimeter.

John Georg Roderer, of Strassburg, became the first professor of midwifery in Germany, at Göttingen, in 1751. He was well versed in anatomy and physiology, and based on them his science of obstetrics; and also aided greatly

in diffusing through Germany a more scientific grade of practical obstetrics. He discouraged the prevalent tendency to use instruments, especially such as involved injury either to the mother or child.

But the application of scientific principles, derived from a correct knowledge of anatomy and physiology, in the practice of obstetrics, made slower progress in Germany, Austria, Italy and Spain than in England, France, or America. The English colonies in North America derived their medical men partially from immigration from the mother country, and in part from enterprising young men who, born in the colonies, resorted to the medical schools of Europe, and especially to the University of Edinburgh, for their medical education. It was chiefly by men belonging to the last named class that the first medical schools were established in Philadelphia and New York, near the middle of the eighteenth century. Consequently the progress of midwifery and all the other practical branches in the English, French and Dutch colonies of America kept even pace with the same in England and France.

On the organization of a medical school in connection with King's (now Columbia) College in New York, 1768, full professorships of Anatomy; Surgery; Physiology and Pathology; Chemistry and Materia Medica; Midwifery and Theory and Practice of Physic were established, and Dr. John V. B. Tennent was appointed to the chair of Midwifery, which he filled with credit several years. About the same time Dr. William Shippen gave lectures on midwifery, in addition to his chair of Anatomy and Surgery in the medical school established in Philadelphia, in 1765.

As nearly all the important advancements in midwifery during the eighteenth century were the result of coincident improvements in anatomy, physiology and surgery, it was natural that in passing from the hands of the midwife it should first find lodgment in the hands of the surgeon before reaching full recognition as an independent branch of medicine. Therefore we find that through the greater part of the eighteenth century, the teaching of

midwifery in the medical schools was committed to the professor of Anatomy or Surgery, and in many places all the three branches were taught by one and the same professor. But its independent position was very generally admitted before the end of the century, and the works of Smellie, William Hunter and André Levret were in general use both as text-books and for reference.

Practice of Medicine: Notwithstanding the many attempts to construct special systems of medical pathology and practice during the seventeenth century, a large majority of the educated practitioners followed the teachings of Sydenham and Boerhaave. The thoroughly eclectic doctrines of the latter, coupled with the display of unusual practical good sense in their application, caused them to maintain a controlling influence, not only during the last half of the seventeenth, but also during a considerable part of the first half of the eighteenth century. But the coincident discoveries in the department of physiology and pathological anatomy; more especially the demonstration of irritability and contractility in living tissues independent of nerve sensibility, by Haller, led rapidly to the final abandonment of what had remained of the humoral doctrines of the ancients and also of the vis anima of Stahl and the vital ether of Hoffman. In their stead, the irritability of Glisson and Haller was accepted as an inherent property of living organized matter, giving it the capacity to respond to the action of stimuli, which led directly to the inference that all vital action, whether normal or abnormal, resulted from the influence of stimuli. If the stimuli were natural, as wholesome food, drink, and air, and in natural proportions, the vital actions resulting were healthy. If they were applied with either too little or too great a degree of intensity, or of an unnatural quality, the resulting actions would be unnatural, constituting disease. Consequently before the middle of the eighteenth century all diseases came to be regarded as the direct or indirect result of the action of stimuli or irritants on the organic irritability, constituting a system of medicine as exclusively solidistic as any of those of the ancients were

humoral. The solidism thus generally adopted led to divergent views in its practical application. As has been previously stated, not a few continued to claim that the irritability of Haller was only nerve sensibility; and that impressions of stimuli were primarily made on sentient nerve matter.

The more immediate followers of Haller regarded his irritability as a vis vitæ, or susceptibility inherent in living organized matter, but causing motion or active phenomena of life only when acted upon by irritants or stimuli.

By some of the leading chemists oxygen was thought to be the essential excitor or irritant. Others claimed that it was caloric or free heat. Still others, like Galvani, claimed that galvanism was the true vital force, the positive pole being identical with irritability and the negative with sensibility.

Those who adhered to the doctrine that nerve structures were the exclusive seat of vital susceptibility called it a "nervous force" or "life giving element", and claimed that it originated in the brain and spinal cord, from which it was transmitted to all other parts of the body by the nerve cords and the blood.

The most eminent and influential advocate of the neurologic pathology was William Cullen, professor in the University of Edinburgh. He was born in Lanarkshire, Scotland, in 1712, of very poor parents, and obliged to work his own way to an education and high position in his profession. His occupations were successively those of a barber, apothecary, ship-surgeon, and then the surgeon of a small village.

He was an intimate friend of William Hunter, and it is said they alternated as practising physicians in Hamilton; one attending to the practice and earning the necessary money for their support, while the other attended the University. By such means Cullen was enabled to graduate in 1740, and six years later he was appointed professor of chemistry in Glasgow. In 1751, he was transferred to the chair of Practice, and in 1756, he was called

to corresponding positions in the University of Edinburgh, where he remained until his death, in 1790.

He embraced fully the doctrine of a "nervous force", or susceptibility, and that all the causes of disease made their primary impression on the nervous system producing either spasm or atony. The more irritant or exciting causes produced direct spasm of the peripheral vessels crowding more blood upon the heart and internal organs, followed by reaction and fever. The more depressing influences caused atony of the vessels primarily and consequent retarded circulation, to be followed by reaction as in the other case.

In 1769 he published his "Synopsis Nosologæ Methodicæ", in which he divided all diseases into four classes, viz: I. Pyrexiæ, with five orders; II. Neuroses, with four orders; III. Cachexiæ, with three orders; and IV. Locales, with seven orders. Fevers, constituting the first order of the first class, he divided into intermittents or periodical, and continued. The latter he divided into Synocha, Synochus and typhus.

His "First Lines of the Practice of Physic" was published in 1777; and a "Treatise on Materia Medica" in 1789. Both these works were written in the English language, and he was one of the first medical professors in Great Britain to give his lectures, both didactic and clinical, in his native language, instead of the orthodox Latin.

The nosology and chief pathological doctrines of Cullen were approved by a large proportion of the profession in Europe, and by a still larger proportion in the English colonies in America, among whom were many who had received their chief medical instruction in Edinburgh and subsequently became the founders of the first medical schools in America. The therapeutic agents relied upon by Cullen and his followers were rest, low diet, cooling drinks, cathartics, and sometimes emetics, opium and venesection in the earlier stages, and later, cinchona bark and wine, with more nourishment. Mercury, in the form of mild chloride, was used both as a cathartic and altera-

tive, especially in the more active cases of inflammation and fever.

Perhaps the most prominent of the direct followers of Cullen were James Gregory, his successor in the University of Edinburgh, Samuel Bard, of New York, and John Morgan, of Philadelphia, who were professors of Practice of Medicine in the first two medical schools founded in America.

Chief among those who were influential in the field of Practical Medicine on the continent of Europe were Gerhard von Swieten, of Leyden, who later went to Austria; Anton de Haen, of the Hague, who became a co-laborer with von Swieten in Vienna; Maximilian Stoll, of Swabia, who devoted much time to the study of epidemics; Theophile de Borden, of Paris, who advocated the doctrine of "vitalism" and defended the practice of inoculation; and J. B. T. Baumes, of Montpellier, who endeavored to construct a purely chemical system of medicine and divided all diseases into five classes, i. e., the oxygenized, the calorified, the hydrogenized, the nitrogenized, and the phosphorized.

But the physician during the last part of the eighteenth century whose medical doctrines attracted the widest attention was John Brown, the author of the well known Brunonian system of medicine. He was born in Berwickshire, Scotland, in 1735, and died in 1788. His father was a poor weaver and unable to give the son a liberal education. But young Brown manifested a remarkable degree of intellectual activity at a very early age, and after working his way through the primary and Latin schools he entered upon the study of medicine as a pupil of Cullen. At the same time he became a friend and comrade of Burns, the poet, and a partaker of some of his vicious habits. Being favored by Cullen he was enabled to pursue his studies in the medical school in Edinburgh, but finally received the degree of M. D. from the University of St. Andrew in 1779. As early as 1770, however, his irregular habits caused an interruption of his friendship with Cullen, and he commenced giving private lectures, set-

ting forth doctrines in many respects antagonistic to those of Cullen. They were attended by many students and members of the profession, and in 1780, was published his celebrated work entitled "Elementa Medicinæ". Eight years later he died from the effects of alcoholic drinks and opium, leaving a wife and children destitute of the necessaries of life—a striking illustration of the fact that no activity or breadth of intellect without moral integrity, can safeguard the man against the seductive and destructive influence of these anæsthetic and narcotic drugs.

Brown's whole theory of disease was founded on the assumption that living matter possessed a vital irritability and all active phenomena of life resulted from the action of stimuli on this irritability. In other words, life was simply a state of excitation. When from natural stimuli, as air, water and food in proper quantities, health was the result. When the stimuli were in excess or deficiency, or irritating in quality, disease was the result. If the stimuli were deficient or depressing the resulting disease was termed asthenic, if in excess or too active the result was sthenic. The resulting changes in structure were termed congestion, irritation and inflammation. His therapeutic principles were equally simple and easily applied. His doctrines found but few followers in England, but became quite popular on the continent, and found some influential advocates in America.

Preventive Medicine: The inoculation of young persons in good health with the virus of variola (smallpox) for the purpose of securing mildness, and therefore safety, in the attack, as well as permanent exemption from future attacks, was practised by the Brahmans of India, and by the Chinese, at least 1,000 years before the Christian era. But it was not known or practised in Europe or this country until the beginning of the eighteenth century. The first account of this practice in Asia was given by Emanuel Timoni, a physician residing in Constantinople, in a communication to the Royal Society of London, in 1714. In 1717 Lady Mary Wortley Montague, the wife of the English Ambassador to the Porte, had her son

inoculated, and, on her return to London in 1721, she had her daughter, aged six years, inoculated. These proving favorable, a son of Dr. Keith was inoculated the same year, and soon after several members of the royal family. The Rev. Cotton Mather, of New England, having read the published papers of Timoni to the Royal Society of London in 1714, induced Dr. Zabdiel Boylston, of Boston, to inoculate his own son, thirteen years old, and two colored servants, the 27th of June, 1721, only two months after the inoculation of the daughter of Lady Montague in London. These cases proving successful, Dr. Boylston the same year inoculated 247 persons of different ages and 39 were inoculated by other physicians, making 286, of which 6 died, while of 5,759 who were attacked in the natural way the same year 844 died. From these beginnings in London and Boston the practice of inoculation spread rapidly in both Europe and America, but not without much and sometimes bitter opposition. It was practised especially in the armies of the different countries to prevent the disastrous consequences of a small-pox epidemic in the midst of an active campaign.

During the American revolution from 1775-1781, many of the newly recruited regiments were placed in camps under good hygienic regulations and subjected to inoculation generally with a resulting mortality of only one in 700 or 800.

Though this practice greatly lessened the aggregate mortality from small-pox during the last half of the eighteenth century it was destined to be soon superseded by the discovery of the preventive power of vaccination with the cow-pox virus by Edward Jenner, of Berkeley, Gloucestershire, England, and published to the world in 1798.

Jenner was born in 1749 and died in 1823. After receiving a good academic education he decided to study medicine, and entered the office of surgeon Ludlow, of Sudbury, near Bristol, as an apprentice. Among the patients visiting the surgeon's office was a milk-maid who had previously had a pustule on her hand caused by

matter from sores on the udder of a cow while milking, and which it was claimed rendered her immune to small-pox. Learning that several such cases had been noticed among milk-maids, the thought occurred to him that if the sore on the udder of the cow from which the virus was communicated to some abrasion on the finger or hand of the milk-maid could be identified, and a way devised for propagating it in sufficient quantity for use for general vaccination instead of the virus of small-pox, it would be a great boon to the human race. In 1770, he went to London and became a pupil of John Hunter. While studying with him he talked freely about the possibility of discovering and propagating the cow-pox virus and using it for the prevention of small-pox and he was advised by Hunter to investigate the subject more thoroughly. When his term of study had been completed he returned to Berkeley and commenced the practice of his profession, because it was in a dairy district, favorable for the prosecution of the investigation that had been so strongly impressed upon his mind. With untiring perseverance he prosecuted his inquiries and experiments for twenty years, and in 1796 he vaccinated his first human subject, James Phipps, with virus from a cow-pox pustule on the hand of Sarah Nelmes contracted while milking. Subsequently both Phipps and Nelmes were found to be completely immune to inoculations with small-pox virus. With the virus from these cases he continued to vaccinate others until the proofs of the value of his discovery were fully established, when in 1798 he published to the world a full account of his work in a paper entitled "An Inquiry into the Causes and Effects of the Variola Vaccina". The paper was soon translated into several of the European languages and circulated freely in most of the countries of Europe and in America.

The first vaccinations in America were made by Benjamin Waterhouse, of Boston, Professor of the Practice of Medicine in Harvard College; who procured virus from Dr. Haygarth, of Bath, England, and vaccinated four of his own children in July, 1800.

Thus was given to the world with the utmost freedom and frankness on the part of its author—perhaps the greatest life-saving discovery known in the history of preventive medicine. Its reception, rapid diffusion, and ultimate effects upon its discoverer will belong to the early years of the nineteenth century.

Another great advance in the prevention of human suffering was commenced by Philippe Pinel in charge of the Hospital Bicêtre, in Paris, in 1792, and subsequently by the Salpétrière. It was while in charge of the Bicêtre, that he boldly removed the chains from many of the insane patients, and instituted that more humane and successful treatment which has since met with universal approval.

CHAPTER IX.

HISTORY OF MEDICINE DURING THE FIRST HALF OF THE NINETEENTH CENTURY.

Discoveries in the Physiology of the Nervous System; in Pathological Anatomy; Physical Diagnosis; and Organic Chemistry. The Discovery of Anæsthesia; and the Practice of Ovariotomy.

As was shown in the two preceding chapters, the chief important and permanent improvements in the several branches of medicine during the eighteenth century were the rapid advancement of inorganic and analytical chemistry, with the laws governing chemical combinations and the addition of electricity and galvanism; the addition of general anatomy by Bichat, and minute anatomy by aid of the microscope; the development of human physiology under the leadership of Albert Von Haller; and the discovery of the protective power of vaccination with cow-pox lymph by Edward Jenner. The last named discovery was announced to the world during the last years of the eighteenth century, (1798) and was met with much adverse criticism and some bitter denunciations. But so complete were the proofs patiently gathered by Jenner, that his work at once commanded the attention of the more enlightened members of the profession in Europe and America; and as fast as samples of the cow-pox lymph could be obtained it was put to the test. This resulted in so rapid an establishment of its efficacy that before the close of the year 1800 it had been approved and successfully introduced into London, Vienna, Paris, Berlin, Saxony, St. Petersburg, and in Boston, Baltimore, and several other cities of the United States. So complete was the general approval of this most valuable discovery, that in 1802 the British government awarded Dr. Jenner the sum of $50,000, and four years later the further sum of $100,000; and a few years later still, he received awards from the presidencies of Bengal, Bombay and

Madras aggregating $35,000. In 1808 he was elected a corresponding member of the National Institute; and in 1857 a monument was erected to his memory in Trafalgar Square, London. Notwithstanding the general adoption of the Jennerian vaccination as a safe and effectual preventive of smallpox by the people and governments of all civilized countries, there still remains a small class of bitter opponents, called anti-vaccinationists.

Progress of Chemistry. During the first half of the nineteenth century inorganic chemistry continued its rapid progress by the labors of Barthollet, Thenard, Vauquelin, Proust, Dumas, Magendie and Orfila of France; Berzelius, in Sweden; Hoffman, Richter, Gmelin, and Schoenbien, in Germany; Dalton, Davy, Faraday and Graham, in England; and Benjamin Silliman of the United States. But the crowning event in the progress of chemistry during this half century, was the development of organic and physiological chemistry by Justus Liebig, of Germany, in his monograph, first presented to the British Provincial Medical and Surgical Association and published in 1842, under the title, "Organic Chemistry in its Relations to Physiology and Pathology." One or two years previously he had published a work on "Chemistry in its Relations to Agriculture", which attracted much attention both in Europe and America. In these publications he endeavored to explain all the phenomena of vegetable and animal life in accordance with purely chemical laws. Analysis having shown that all organized bodies were composed either of four elements, i. e., carbon, hydrogen, oxygen and nitrogen, or of the first three elements named only. He called the first, nitrogenous elements, and the second, non-nitrogenous or carbonaceous. The same analytical examination of the various food substances showed them to be composed of the same two classes of matter. Consequently Liebig claimed that the nitrogenous food elements were used for the growth and repair of the organized structures of the body, while the carbonaceous, or hydro-carbons, were oxidized for the production of heat or stored in the form of fat. In the first class of food substances he included the fibrinous and albuminous parts of animals, including

eggs, the casein of milk, and the gluten in cereals or grain. In the second class he included the fats or oils, the starch, sugar, gum, and the alcohols; all of which were supposed to unite with the oxygen furnished by respiration, constituting a form of combustion for the maintenance of animal heat and force. When they were consumed too rapidly, evolving heat in excess, fever was produced. If they were taken faster than they could be oxidized or burned up, they were stored in some of the tissues in the form of fat. As proof of the correctness of his theory, he claimed that the inhabitants of the colder regions of the earth consumed much more of the non-nitrogenous or combustible food than the inhabitants of the tropical regions.

These views and classifications of Liebig were so plausible and so easily comprehended that they were very generally adopted, and very soon became incorporated into all our literature, both professional and secular. Their correctness, however, was denied by some of his contemporaries, among whom were Lehman, Miescher and Voit, in Germany; Sandras and Bouchardet, of France; William Prout, of England, and myself in this country, as will be seen in the sequel.

Directly parallel with the progress of both organic and general chemistry, came the brilliant discovery of Sir Charles Bell, of London, concerning the distinct sensory and motor functions of the posterior and anterior roots of the spinal nerves and their connections, published in 1824; the experiments of James H. Miller, of Baltimore, Md.; M. Brachet, of France, and Professor Reid, of the British Association of Science, concerning the functions of the great sympathetic or ganglionic system of nerves, between 1809 and 1838; the work of Marshall Hall in demonstrating the reflex or excito-motor system of nerves as published in 1838; and experiments to determine the special function of different parts of the brain and medulla oblongata, by Magendie, Flourens, Reid, H. H. Smith, of Philadelphia, and others.

The researches of all the foregoing investigators in the field of nerve physiology were well supplemented by the very valuable work of Dr. Samuel George Morton, of Philadelphia, entitled "Crania Americanæ", published in 1839.

The experiments of Sir Charles Bell fully demonstrating that the posterior columns of the spinal cord and the nerves proceeding therefrom were sensory in their function, and the anterior columns, and the nerves connected therewith, were motor, were performed in 1816. By subsequent experiments he demonstrated the connection of the nerves controlling respiration with the medulla oblongata.

The investigations of James H. Miller, of Baltimore, were commenced in 1809 and prosecuted until he fairly demonstrated the important functions of the great sympathetic or abdominal plexuses of nerves, and taught the same in his lectures in Washington Medical College in 1827, a few years previous to the publication of M. Brachet's researches concerning the same subject in France. Later Marshall Hall, by additional experimentation, found that not only the nerves of respiration, but also those of the organs of circulation, had their center in the medulla oblongata, and claimed these, together with the nerves controlling the sphincter muscles of the body, as constituting a distinct system called "excito-motory". The results of his investigations were presented in a communication to the Royal Society in 1833.

While the foregoing developments in organic chemistry were taking place in Germany, and the discoveries in the physiology of the nervous system, chiefly in England and America, a no less important evolution of pathological anatomy and physical diagnosis was in progress, chiefly in France. From the study of the normal tissues of the body by Bichat in the closing years of the eighteenth century, it was a natural step in progress to investigate the same tissues in the different stages of disease. For this purpose the Parisian hospitals La Charité and Hotel Dieu, afforded the best opportunities, and the leading physicians engaged in the work were Bayle, Corvisart, Laennec, Chomel, Louis, Andral and Gavarret.

Jean Nicolas Corvisart was born in 1755, a native of Dricourt in Champagne. He studied medicine in Paris as a pupil of Vicq d'Azyr and Petit; and in 1795 was made Professor of Medicine in the clinic of the Charité Hospital. Subsequently he became successively ordinary physician of the

First Consul, and then of the Emperor Napoleon. Notwithstanding these official relations he found time to investigate minutely the pathological changes in different stages of diseases of the heart and lungs. In 1808 he translated from the German Auenbrugger's work on percussion as a means for the diagnosis of diseases within the chest, and in his hospital clinics was perhaps the first to apply the ear to the naked chest (immediate auscultation) in studying the sounds of the heart. He published a valuable work on diseases of the heart, and aided Bayle and Laennec in studying pulmonary tuberculosis. He gained a very high reputation for integrity and kindness, which added much to his influence.

Gaspard Laurent Bayle studied medicine in Montpellier, and after several years of service in connection with the army he became one of the physicians to the Charité Hospital in Paris, where he and Laennec conducted numerous post-mortem examinations of those who had died from pulmonary consumption. Bayle accurately described the gray miliary tubercle, and Laennec described the several stages of tubercular infiltration.

To these were added the results of dissections of no less than 358 bodies dead from pulmonary consumption by M. Louis, from which he obtained descriptions of the tubercular disease in every stage of its progress. But the most important work of both MM. Chomel and Louis was in tracing the structural changes taking place in the abdominal viscera during the progress of continued fevers, which up to their time had been called typhus or adynamic fevers. They soon pointed out with great accuracy the visible changes in the liver, spleen and the glandular structures, in the mucous membrane of the intestines, and those in the mesentery. They found in some cases progressive enlargement and softening of the liver and spleen, tumefaction and softening of the mesenteric glands, and enlargement and ulceration of the glands of Peyer and Brunner, more especially in those of the lower half of the ileum and its connection with the colon, and in the middle and advanced stages much gaseous distension of the intestines. In other cases they found much less change in the glands of the intestines and mesentery,

less abdominal tympanitis, and more softening of the structures of the spleen and heart, with darker color and less coagulability of the blood. Louis, adopting a numerical method, placed all those presenting the first assemblage of pathological events in one series, calling them cases of abdominal typhus; those presenting the symptoms named in the second series he called simply cases of typhus. Both he and his co-workers, however, found a less number of cases in which the pathological changes, both in the viscera and on the cutaneous surface, were so mixed that they were obliged to make a third series called doubtful.

While these investigations were being prosecuted in Paris, the same methods of clinical and post-mortem study by Gerhard, of Philadelphia, Enoch Hale and J. Jackson, of Boston, and Austin Flint, then of Buffalo, all of whom had been visitors in Paris, were being pursued in the several cities named. The same line of study concerning the pathological changes in the cases of continued fever in the London hospitals was also pursued by Sir William Jenner, and with the same results. An account of the work of Enoch Hale was published in 1833; that of Gerhard in 1835; of M. Louis in 1841; of Sir William Jenner in 1850; and of A. Flint in 1852.

In the meantime, while the foregoing investigators were pursuing their studies concerning the pathological changes that take place in the various organized structures, MM. Andral and Gavarret of Paris were making equally patient investigations chemically concerning the changes in the pathological conditions of the blood, the secretions and excretions in all the more important febrile and inflammatory affections, which resulted in the publication by Andral of his valuable "Essay on the Pathology of the Blood" in 1843. His work showed conclusively that in all acute general diseases the blood and other fluids of the body suffered changes both in composition and quality as important as those in the organized structures, and thereby checked the exclusive solidistic doctrine that had followed the discovery of the irritability of Haller and the neurology of Cullen.

Physical Diagnosis: During the progress of all the

foregoing pathological investigations, efforts were made to determine the connection of each change with diagnostic symptoms marking the successive stages of the disease. Bayle and Laennec, in their clinics, had not only revived the practice of percussion as first taught by Auenbrugger, but they had also practised immediate auscultation, that is, the direct application of the ear to the chest for detecting the sounds produced by movements of the heart and lungs. To facilitate listening over any and all parts of the chest, Laennec constructed a tube of cedar wood, with an ear piece at one end and a funnel-shaped opening at the other, which was called a stethoscope. The invention attracted much attention, and greatly increased the practice of auscultation and percussion to aid in the diagnosis of diseases in the chest. In 1819 was published his work, "De l'Auscultation Mediate, ou Traité du Prognostic des Maladies des Poumons et du Cœur, etabli principalment à l'aide de ce nouveau Moyen d'Exploration." This was soon translated into most of the languages of Europe, and rapidly extended the practise of physical exploration as an aid in diagnosis, and added much to his reputation. But the next year his health began to fail and he died from pulmonary tuberculosis in 1826, at the age of forty-five years.

The pleximeter, for aiding in the practice of percussion, was invented by P. A. Piorry, of Paris, in 1826; and he extended its use to the abdomen as well as to the thorax.

The practice of physical diagnosis of the French was introduced into the German states and Austria by Rokitansky and Skoda, of Vienna; into Great Britain by John Forbes, William Stokes and C. J. B. Williams; and into America by James Jackson Jr., of Boston, W. W. Gerhard and Samuel George Morton, of Philadelphia, and Austin Flint, Alonzo Clark and G. P. Camman, of New York.

Both the stethoscope of Laennec and the pleximeter of Piorry underwent many modifications by different parties in different countries; the most important of which was the completed binaural stethoscope of Dr. Camman of New York in 1852. During my three years of medical study from 1834 to 1837 I received no instruction in the practice of ausculta-

tion, but was told by the professor of practical medicine that a stethoscope had been invented by Laennec and he thought it would be found useful. I accordingly, the same year, purchased a plain primitive cedar wood instrument, and a few years later one of Dr. Camman's more perfect binaural stethoscopes.

ANÆSTHESIA: One of the most important discoveries in the history of medicine was made during the last decade of the first half of the nineteenth century by members of the medical profession in the United States of America. During the last three or four centuries narcotics and alcoholic liquors had frequently been administered to patients to lessen the severity of their pains during surgical operations, and Sir Humphrey Davy had vaguely suggested that the inhalation of nitrous oxide gas might be found useful for the same purpose. The first direct experiments for producing complete anæsthesia, or unconsciousness of pain for surgical purposes, however, were made by Horace Wells, a practitioner of dentistry in Hartford, Connecticut, in 1840. He was a native of that State, born in 1815. After several times demonstrating his ability to render a patient insensible to pain by the inhalation of nitrous oxide gas, he extracted teeth without pain under its influence, in Hartford, Dec. 11th, 1844. During the next month, January, 1845, he caused the inhalation of sulphuric ether vapor while Dr. Marcy removed a tumor (wen) from the head of a patient without pain or consciousness. During the same month he communicated these facts to the medical and surgical staff of the Massachusetts General Hospital in Boston, and attempted to anæsthetize a patient for an operation before a class in attendance.

From mental trepidation and over-anxiety he failed to effect complete anæsthesia, and was hooted out by the students as a failure. He, however, continued to extract teeth under the successful anæsthetic effects of both the nitrous oxide and ether, which was well known to both Charles T. Jackson and Dr. W. T. G. Morton, of Boston. The latter had been a student of Dr. Wells and was a practitioner of dentistry. Dr. Jackson was an eminent chemist and well ac-

quainted with the effects of inhaling ether, though he had made no attempt to apply its use in surgery. In October, 1846, Dr. Morton successfully anæsthetized a patient in the Massachusetts General Hospital with ether, while Dr. J. C. Warren performed an operation, a full account of which was published in the Boston Medical and Surgical Journal, November 18, 1846. Jackson and Morton claimed this as the first demonstration of the practicability and safety of surgical anæsthesia, and soon obtained a patent for their anæsthetic under the fictitious name of "Letheon." This, however, was soon shown to be nothing but a pure specimen of sulphuric ether, and their patent became void.

Several years later it was satisfactorily shown by Dr. J. Marion Sims, that so early as March 30, 1842, Dr. Crawford W. Long, of Georgia, had safely extirpated a tumor from the neck of a Mr. Venables while profoundly under the anæsthetic influence of ether. And during the next three years the same surgeon performed several other operations with the patients under the complete influence of the same anæsthetic. But he published no account of his work until 1849.

Chloroform as a chemical substance was discovered independently, and nearly at the same time, in 1831, by Mr. Samuel Guthrie, of Sackett's Harbor, N. Y., and Soubeiran in France. Its properties were studied by Liebig, and it was named chloroform by Dumas. It was first used by Sir J. Y. Simpson, of Edinburgh, for producing anæsthesia instead of ether, in November, 1847.

Such is a simple history of the discovery of anæsthesia as a means of temporarily preventing or relieving pain in the practice of medicine, surgery and midwifery, as produced by the three leading general anæsthetics, i. e., nitrous oxide, sulphuric ether, and chloroform. When properly used it is one of the most beneficent discoveries in medical history. At first its use met with much opposition, as is usual with all new discoveries of importance. This, however, soon ceased and was followed by a tendency to abuse, by resorting to it on trivial occasions, or prolonging its effects continuously longer than necessary.

Ovariotomy: Another advancement of much importance in the domain of operative surgery, during the first half of the nineteenth century, was the deliberate planning, and the successful execution, of the operation of ovariotomy by Dr. Ephraim McDowell, of Danville, Kentucky, in December, 1809. It is true that the ovary had been several times removed as an incidental or necessary accompaniment of operative procedures for the removal of other parts, but not as an independent operation for ovarian disease. The first patient operated upon by Dr. McDowell was a Mrs. Crawford, who was afflicted by an ovarian tumor, and he proceeded to deliberately remove it without the aid of either anæsthetics or special antiseptics, for at that time neither was used or known to the profession. The patient made a good recovery, and lived in fair health more than thirty years afterwards. He performed the operation in all thirteen times, resulting in eight complete recoveries and five failures. A full account of them was published in the "Eclectic Repository and Analytic Review" for April, 1816.

Dr. McDowell died in 1830, and a monument was erected to his honor in Danville, Kentucky, in 1879. In 1831, a single ovariotomy was performed by Dr. Nathan Smith, but no one ventured to follow his example by repeating the operation until 1843, when Dr. John L. Atlee, of Lancaster, Pennsylvania, successfully removed a very large ovarium. The following year, 1844, the operation was repeated with success by his brother, Dr. Washington L. Atlee, of Philadelphia, Pennsylvania; and also by Dr. Alexander Dunlap, of Springfield, Ohio. Edmund Randolph Peaslee, of New York, performed his first ovariotomy in 1850, at which time thirty-six operations, in all, had been performed by eighteen operators, resulting in twenty-one recoveries and fifteen deaths. By this time, however, the use of anæsthetics had received the sanction of leading surgeons, obstetricians and gynecologists on both sides of the Atlantic, and greatly encouraged and facilitated the performance of otherwise formidable surgical operations of all kinds. But at this early period probably no one except the originator, Dr. McDowell, exerted more influence in sustaining the propriety and dem-

onstrating the feasibility of ovariotomy than Washington L. Atlee, of Philadelphia, and his brother John, of Lancaster, Pennsylvania. And, as we shall see in the sequel, it proved the beginning or foundation of the whole system of modern abdominal surgery.

From the foregoing review of the discoveries in the physiology of the nervous system; the development of pathological anatomy and physical diagnosis; the evolution of organic chemistry; the discovery of true anæsthesia and its application to the prevention or relief from pain in all the practical departments of medicine, all resulting from patient observation, experimental research, and the application of known scientific principles to the construction of new instruments and appliances, we see a more rapid, more extensive and more important enlargement of the scientific basis of medicine, during the first half of the nineteenth century, than during any previous period in its history. It was the first period in the history of medicine when strictly scientific investigations and their results gained predominance and gave a decided check to the persistent tendency to construct so-called schools or systems of medicine on theoretical dogmas or general hypotheses.

One of the earliest and most direct effects of the development of organic chemistry, was its application to the separation of the active constituents of crude vegetable drugs, and of the pathological changes in the blood and secretions of the human body during the progress of disease. The latter, as we have already seen, was begun and successfully prosecuted by Andral and Gavarret, in Paris, from 1833 to 1843. The chemical research for the active constituents of opium, nux vomica and cinchona bark was commenced in 1816, when morphia was separated from opium, and in 1818 Pelletier and Caventou obtained strychnia from the nux vomica, and in 1820 the same chemists separated quinia from the cinchona bark. So much interest was excited in this line of investigation, that in 1835 the Society of Pharmacy of Paris offered a prize of 500 francs for the discovery of, and the mode of preparation of, the active constituent in the digitalis purpurea. This was increased in 1840 to 1,000

francs, which was awarded to M. Homolle and M. Quevenne for the discovery of digitaline in 1846.

The work thus begun has been continued with such activity and success as to effectually revolutionize the whole field of pharmacy and bedside prescribing. It has resulted in relegating nearly all crude drugs to the storehouses or laboratories of the wholesale manufacturing pharmacists, giving to the physician a greater variety of active medicines in a simple pocket case than he formerly had in his capacious and well-filled saddle-bags, and presenting for the patient to swallow only grains or minims, and those often encased in tasteless capsules, instead of spoonful doses of bitter powders or bowlfuls of still more bitter infusions or decoctions.

In direct connection with the separation of the active constituents of crude drugs, came investigations, both experimental and clinical, by which the actual physiological action of such constituents on the living system was determined and their application in the treatment of diseases rendered more exact and efficient. The important discoveries concerning the functions of different parts of the brain and nervous system opened the way for a more correct knowledge of insanity and mental impairments, and thereby improved that department of medical jurisprudence, and also led to a better understanding of the nature of many previously obscure nervous affections, as may be seen by reference to the work of John Abercrombie, of Edinburgh; the Essay on Shaking Palsy, by James Parkinson, 1817; and the papers of William and Daniel Griffin, of Limerick, on Spinal Irritation, in 1834.

Notwithstanding the great activity and rapid progress made in all the lines of original research to which allusion has been made, there were no attempts to create new systems or universal theories of disease during the first half of the ninteenth century. The three leading ones of the latter part of the previous century, i. e., the Cullenian, the Brunonian and Broussaian, culminated in their influence before the end of the first quarter of the nineteenth, and began to decline. As they were all based on the exclusive

doctrine of solidism, with its susceptibility or irritability and stimuli, and making the first step in disease irritation, and the second inflammation with fever, their foundation was being impaired by the rapidly accumulating facts evolved by analytic investigations concerning the pathology of the blood and secretions by Andral, Gavarret and their followers, and by the microscopic demonstration of living organized cells in the blood and their modification in disease. Though the Brunonian system was sustained by the eminent Benjamin Rush, of Philadelphia, and by Samuel Jackson in his "Principles of Medicine", and by others both in England and on the Continent of Europe, the neurological pathology of Cullen maintained its supremacy, as shown by the Treatise on Fevers, by Southwood Smith in England and by the systematic works on the "Practice of Medicine" by John Eberle, in 1829, and by George B. Wood, in 1847; in all of which it is claimed that the first link in the chain of morbid actions constituting febrile affections is an irritative or morbid impression on the nervous system. Practically, however, it made but little difference whether attempts were made to trace all morbid actions to primary impressions on the nerves, or on the inherent irritability of all the tissues, the therapeutic inferences led to the adoption of the general antiphlogistic system of treatment for nearly all acute diseases, whether general or local. The system consisted essentially in rest, low diet, cooling applications, venesection or local bleeding, cathartics, and sometimes emetics, in the first stage, followed by sedative diaphoretics and diuretics, and mercurial alteratives, and in the later stages tonics and more nourishing diet. It was at the climax of its popularity during the first half of the nineteenth century, and like all other general therapeutic systems, was carried to unreasonable extremes, especially in blood-letting, emeto-cathartics and mercurials, by a small proportion of practitioners.

The general adoption of Jennerian vaccination at the beginning of the century effectually limited the destruction of human life by sweeping epidemics of small-pox;

and the rebuilding of London on a more sanitary basis after its destruction by fire in 1666, and important sanitary improvements in and around Cairo in Egypt, and most of the great cities of Europe, equally arrested the further destructive prevalence of epidemics of the plague in Europe, and greatly diminished those of typhus fever.

The most noted epidemic diseases of the first half of the nineteenth century in Europe and America were cholera, influenza, yellow fever, diphtheria, erysipelas, and cerebro-spinal meningitis. From 1817 to 1822 cholera prevailed severely in India, China and the south parts of Asia. In 1831 it was very severe and fatal throughout Europe, and in 1832 it appeared in Canada and extended rapidly over the United States. During the two following years it prevailed in Mexico and the West India Islands. In 1836-7 it visited Central America and again scourged the southern part of Europe. It then disappeared from both Europe and America until in 1848 it revisited almost every country in Europe, and in 1849 it was equally severe in America, where it continued to recur nearly every summer until 1854. Both erysipelas and cerebro-spinal meningitis have been epidemic in limited localities in many countries. But their most noted and extensive prevalence during the first half of the nineteenth century was from 1841 to 1846, when they extended over the greater part of the United States and some portions of Europe. Influenza, in its true epidemic form, swept over the greater part of Asia, Europe and America in 1807; 1831-3 and in 1847, attacking a greater proportion of the whole population than any other epidemic of modern times, but resulting in a less ratio of mortality.

Diphtheria prevailed in some parts of Europe from 1818 to 1821, as described by Bretonneau, of Tours, and to a limited extent in this country in 1831, as described by Dr. John Bell, of Philadelphia.

CHAPTER X.

HISTORY OF MEDICINE DURING THE FIRST HALF OF THE NINETEENTH CENTURY CONTINUED.

The Progress of Medical Education; the Organization of Medical Societies, Local, State and National, and their Influence on the Progress of Medical Science and Practice.

It has been shown in the preceding chapters that not until during the last half of the eighteenth century did the three primary divisions of medical practice become so far affiliated and freed from the dominating influence of ecclesiastics, barbers and uneducated midwives, as to be generally recognized as one profession. Consequently it was not until the period just named that the medical schools in various countries began to make adequate provision for full instruction in the Practice of Medicine, Surgery and Midwifery, as well as in Chemistry, Anatomy, Physiology and Materia Medica. And even down to the close of the first quarter of the nineteenth century in a large majority of the medical schools active instruction was given only half or three-quarters of the calendar year. A large majority of students looked for the larger part of their medical knowledge to the books and instruction of private preceptors or practitioners, to whom many were indentured legally, the same as in learning the mechanical trades. Many resorted to the medical schools only for one collegiate year, and not a few attended no medical college, but after serving the allotted time as students, they entered upon the general practice of medicine with no other credentials than the certificate of their preceptor. Only a minority of those engaging in the study of medicine attended regularly some medical school three or more years and graduated either as bachelors or doctors of medicine. The proportion doing so was greater on the continent of Europe. In Great Britain perhaps as large a proportion of medical students attended medical college instruction in schools connected with the

leading hospitals of London, and with the universities of Cambridge, Edinburgh, Glasgow and Dublin, but instead of taking college or university degrees they were very generally examined and licensed by one of the royal colleges organized for that purpose.

In the United States of America at the beginning of the nineteenth century only four medical colleges were in existence, i. e., one in Philadelphia; one in New York; one in Boston; and one in Hanover, N. H. They had all been organized as Medical Departments of Universities or general collegiate institutions, and were known as the Medical Schools of Pennsylvania University, of Columbia College, N. Y., of Harvard College, Mass., and Dartmouth College, N. H. The whole country was comparatively new, it having been recognized as an independent people among the nations of the earth less than twenty-five years. Its 5,000,000 of inhabitants were sparsely distributed over thirteen states bordering on the Atlantic coast extending from Maine to Florida, with neither railroads nor even good wagon roads to facilitate intercommunication of one State with another. Consequently at the opening of the century an aggregate of not more than one hundred and fifty medical students were found in attendance at the four medical schools then existing, and not more than thirty or forty graduated, either as bachelors or doctors of medicine in any one year. Yet it would not be correct to imply, as has been done by some writers, that the country was then, or at any previous part of its colonial history, destitute of fairly well educated physicians and surgeons. For some such very generally came with the immigrants both from Great Britain and the continent of Europe, and, as explained in previous chapters, not a few young men resorted to the University of Edinburgh and to the hospitals and schools of London and Paris.

Another source of valuable medical and surgical instruction for the American colonists was the almost constant wars waged by Britain and France with each other and with the Indian tribes in their American colonies; and in which the inhabitants of the colonies were compelled to take part. In doing so they were brought in frequent contact with the

members of the medical and surgical staffs of the English and French armies operating in America.

Neither is it true that the very large proportion of practitioners both in this country and in Europe, who depended for their medical education entirely upon the books and instruction of their preceptors without ever entering either a medical college or public hospital, were entirely destitute of valuable clinical instruction, as has been often stated. On the contrary such students almost from the beginning became the constant assistants of their preceptors in all office work, such as extracting teeth, venesection, dressing wounds, and all varieties of minor surgical operations; and in the last half of their pupillage frequently accompanied their preceptors in their visits to important cases, or went as substitutes in cases of emergency.

From all the preceding circumstances and conditions the impartial investigator will find that through all the last half of the eighteenth and the first quarter of the nineteenth centuries there was but little difference in the scientific attainments, practical skill, and general professional standing of the medical profession in this country and in Europe. It is true that during the time under consideration there were in all the countries many ignorant or only partially educated practitioners; many charlatans and bombastic pretenders, as well as visionary theorists of every grade.

And is it not equally true, that now in the early years of the twentieth century of the christian era, all these evils and evil classes still exist throughout all the countries more or less? For there is scarcely a pathy or ism or theoretical dogma of the seventeenth and eighteenth centuries that does not have its followers among us. The anti-vaccinationists, the anti-vivisectionists, the Eddyites, the Dowieites, the Osteopaths, and those wearing the trade-mark of him who invented the two, so-called, universal principles, i. e., "Similia Similibus Curantur", and the greater the attenuation of the dose the greater the curative power, still flourish on both sides of the Atlantic Ocean.

But all this does not prove that true medical science and art have not been progressing with increasing rapidity in

all their departments; for there is no garden so rich that it does not have weeds, and no forest so stately that it does not have its shrubs and parasites.

No sooner, however, had the several departments of medicine become united, and the medical schools prepared to teach the whole, than an increasing disposition was manifested to unite in forming society organizations for friendly intercourse and mutual improvement. Many of these organizations embraced not only the branches of medicine proper, but also many of the collateral sciences. Before the beginning of the nineteenth century the following societies, in which medical men had more or less interest, had been organized in Europe and America: The Royal Colleges of Physicians, Surgeons and Apothecaries, chiefly for the regulation of medical studies and the examining and licensing of candidates for permission to engage in the practice of medicine; the Royal Society of London for the promotion of Science, in 1662; the Academy of Sciences in France, in 1665; the German Scientific and Medical Association at Schweinfurst in 1652; the Medical Society of New Jersey organized at New Brunswick, in 1766; the Massachusetts State Medical Society, in 1781; the Connecticut State Medical Society, (1792) and the New Hampshire Medical Society, in 1791; the Philadelphia College of Physicians, in 1787; and the Philadelphia Medical Society, in 1789.

The several societies enumerated were sanctioned by acts of incorporation by the legislative bodies of the several countries or states in which they were located. Their avowed objects were the promotion of friendly intercourse, the advancement of medical science, and the support of the usefulness and honor of the medical profession. Nearly all of them are still in existence, and have proved true to the objects of their organization.

Perhaps the first of the society organizations in America to commence the publication of a separate volume of transactions was that of Massachusetts prior to 1800. It contained papers by ten of its members, the most important of which were: "An account of the weather and epidemics of Salem, County of Essex, for the year 1786, with a bill of mortality

for the same year," by Edward A. Holyoke, M. D.; "A case of Empyema successfully treated by an operation" by Dr. Isaac Rand, in 1783; "Observations on Hydrocephalus Internus by operation" by Dr. Isaac Rând, Jr., in 1789; and "An account of an aneurism of the thigh cured by an operation and the use of the limb preserved" by Thomas Kast, M. D., in 1790. Another volume was not published by the same society until 1808.

In Great Britain the British Royal Society has regularly published its "Philosophical Transactions" since 1665.

The Royal Medical Society of Edinburgh was founded in 1737, and the Medical Society of London in 1773.

During the eighteenth century many so-called learned societies were organized in France, Germany, Switzerland and Italy, chiefly devoted to the consideration of strictly scientific and philosophical subjects, but in the membership of which were embraced many physicians. Perhaps the most famous of these societies was the "Königliche Academie" formed by the union of two preceding societies by Frederick the Great in 1744 at Berlin; and the Königliche Gesellschaft der Wissenschaften zu Gottingen founded by the influence of Haller in 1751.

In France there were Sociétés Royales des Sciences of Montpellier in 1706, of Bordeaux in 1714, of Lyons in 1724, and Dijon in 1725.

In Switzerland, the "Gesellschaft der Artze und Naturforscher" of Basil in 1751, and the "Naturforschende Gesellschaft" of Zurich, 1757, exerted much influence, as did also the Imperial Russian Society of St. Petersburg, 1724; the Royal Swedish Academy of Stockholm, 1739; and the Royal Danish Society at Copenhagen.

The formation of medical and scientific societies by which members of the profession were frequently brought together for the reading of papers, and for the discussion of questions pertaining to both the science and practice of medicine, has proved to be one of the most efficient agencies for the development and diffusion of medical knowledge that we possess.

Coincident with the formation of scientific and medical

societies and the publication of their transactions, came also the printing of newspapers, magazines, and periodicals. The first were generally published weekly and were devoted to politics and miscellaneous news items; the second were more generally published monthly and devoted to literature and art; the third were published monthly or quarterly and were more generally devoted to some departments of science or medicine. The first weekly newspaper of which we have any record was the London Weekly News, first issued May 23rd, 1622, and edited by Nathaniel Butters and Nicholas Bourne. The next one to appear was "The Gazette de France", May 30th, 1631. One of the early and most important journals devoted to both medicine and scientific topics generally was called "Der Arzt", issued in 1759, and was continued twelve years under the management of Joh. Aug. Unzer, an eminent physiologist and practising physician at Hamburg.

A Journal devoted to Military Medicine and Surgery was published in Paris, from 1782 to 1788. Some translations from this were published in New York in 1790. The first original medical journal, however, published in America was The Medical Repository, commenced in 1797 at New York, and issued quarterly until 1824. It was ably edited by Drs. Elihu H. Smith, Edward Miller, and Samuel L. Mitchell.

No other medical periodical appeared in this country until September, 1804, when the Philadelphia Medical Museum made its appearance, edited by Dr. John Redman Coxe, followed one month later by the Philadelphia Medical and Physical Journal, edited by Dr. Benj. Smith Barton.

These several journals, together with those established in Europe during the last half of the eighteenth century, called forth much talent hitherto dormant, by eliciting essays and papers from many of the more intelligent members of the profession in the several countries; by publishing the proceedings of the medical societies; and by affording a free channel for dignified scientific discussions. Thereby they became efficient auxiliaries to the medical colleges and

societies in the great work of medical education and advancement.

With the organization of medical societies and the fair inauguration of a medical periodical press, there came more general discussions concerning the necessity for appropriate and just laws regarding the qualifications of physicians and the preservation of the public health.

The few and very limited attempts to establish some standard of qualifications for those who should be permitted to engage in the practice of medicine and surgery, made during the Grecian, Roman and Arabian periods of medical history, have been noticed in preceding chapters. But not until the permanent establishment of the Royal College of Physicians and Surgeons in Great Britain during the eighteenth century, and the more stable condition of the leading Universities on the continent of Europe, did these several institutions become invested with authority to examine all parties desiring to commence the study of medicine, and to grant permission to such only as possessed an academic or good general education, including the natural sciences and the Latin language. The same institutions were also invested with authority to adopt a curriculum of medical studies, generally extending over a period of four or five years, with annual examinations in progress, and the final granting of licenses or degrees to such as completed the course satisfactorily. And none but those who received such licenses or degrees were legally authorized to practise medicine and surgery in the countries in which the licensing institutions were located.

In the American colonies, prior to their declaration of independence of Great Britain in 1776, but few laws were enacted having for their object the regulation of medical education and practice. The earliest of such laws of which we have any record related to the practice of midwifery, which was almost exclusively in the hands of uneducated midwives. In July, 1716, the legal authorities of New York City adopted and proclaimed an ordinance as follows: "It is ordained that no woman within this corporation shall exercise the employment of midwife until she have taken oath

before the mayor, recorder or an alderman to the following effect: That she will be diligent and ready to help any woman in labor, whether poor or rich; that in time of necessity she will not forsake the poor woman and go to the rich; that she will not cause or suffer any woman to name or put any other father to the child, but only him which is the true father thereof, indeed, according to the utmost of her power; that she will not suffer any woman to pretend to be delivered of a child who is not, indeed, neither to claim any other woman's child as her own; that she will not suffer any woman's child to be murdered or hurt; and as often as she shall see any peril or jeopardy, either in the mother or child, she will call in other midwives for council; that she will not administer any medicine to produce miscarriage; that she will not enforce a woman to give more for services than is right; that she will not collude to keep secret the birth of a child; will be of good behavior; and will not conceal the birth of bastards." (Baas.)

Such an ordinance sufficiently indicates the condition of midwifery practice in the early part of the eighteenth century.

So far as is known, the first male physicians known to have engaged in the practice of obstetrics in this country were Dr. John Moultrie, a Scotchman, who settled in Charleston, S. C., in 1733; Dr. John Dupuy, of New York, whose death was announced with regret in the N. Y. Weekly Post Boy, July 22nd, 1745; and Dr. James Lloyd, a pupil of William Hunter and Smellie, who commenced practice in Boston in 1752. And as has been stated in a previous chapter, Dr. William Shippen, Jr., of Philadelphia, was the first to give a course of lectures on Obstetrics, and Dr. John V. B. Tennant, of New York, the first to receive the appointment of full professor of midwifery, which was in the Medical Department of Kings College, N. Y., in 1767.

The first law for regulating the practice of medicine and surgery was enacted by the General Assembly of New York in 1760, as follows: "No person whatsoever shall practise as physician or surgeon in the City of New York before he shall have been examined in physic and surgery, and ap-

proved of and admitted by one of his Majesty's Council, the Judges of the Supreme Court, the King's Attorney General, and the Mayor of the City of New York for the time being, or by any three or more of them, taking to their assistance for such examination such proper person or persons, as they in their discretion shall see fit." A penalty of five pounds was prescribed for all violations of the law; but its operation was limited to the City of New York. In 1772 a similar law was enacted by the Colony of New Jersey.

The law of 1760 in New York remained substantially the same until it was superseded by an Act of Legislature of that State passed in 1797, which prohibited all persons from practising physic or surgery in that state without a license from one or more of the officers named in the law of 1760, under a penalty of $25 for each offense. The period required for medical study was made four years, with a deduction of one year in favor of those who had graduated at a literary college. Each candidate was also required to furnish the examining officers with a certificate of the time he had studied, verified by the oath of his preceptor; and his license was to be filed in the office of the Clerk of the County in which he commenced practice. Students who had received the degree of bachelor or doctor of medicine from a medical college were permitted to practise on filing a copy of their diploma without further examination.

The medical society that had existed in New Jersey since 1766 was incorporated by an Act of the Legislature of that State in 1790, under the name of the Medical Society of the State of New Jersey. By the Act of incorporation that State Society was authorized to appoint censors to examine and license candidates for permission to practise medicine in that state. The terms of study required, and all the regulations adopted, were much the same as those prescribed in the New York law of 1797. The New Jersey law also authorized the formation of district or county societies whose delegates were to constitute the State Society.

The Medical Society of the State of South Carolina was incorporated by the Legislature in 1797, but no provision was made for examining persons for license to practise.

In 1799 the "Medical Chirurgical Faculty of the State of Maryland" was incorporated by the State Legislature, and given power to elect by ballot twelve persons of the greatest medical and chirurgical abilities in the State," who shall be styled the Medical Board of Examiners for the State of Maryland." It was made the duty of said Board "to grant licenses to such medical and chirurgical gentlemen as they either by examination or upon the production of diplomas from some respectable medical college, may judge adequate to commence the practice of the medical and chirurgical arts." By a supplementary act of the legislature passed in 1801, the State Board of Examiners required all persons proposing to practise in the State, whether graduates of medical colleges or not, to appply for a license before commencing practice; and all who were licensed by the Board were by virtue of such license made members of the State Society. A penalty of fifty dollars was imposed for each violation of the foregoing provisions, to be collected in the County Court where the offender might reside.

It is thus seen that Maryland was not only one of the earlier states to enact laws for the protection of her citizens against the inroads of ignorance and empiricism, but also that her laws relating to the subject were the most simple and effectual.

By the foregoing details it appears that six of the original thirteen states had recognized their right and duty to legislate on the subjects of medical education and practice during the first twenty years after the achievement of their independence. The union of all legitimate branches of medical science and practice in one profession with fairly well established medical schools; the organization of medical societies for mutual improvement and the free discussion of all medical subjects; and the initial development of a medical periodical press, were the important agencies that at the beginning of the nineteenth century greatly increased the rapidity of progress in all that relates to the advancement of medicine and its application to the various interests of human society. These several agencies having acquired only an initial beginning with the commencement of the nine-

teenth century, have since increased in extent and influence with a rapidity difficult to appreciate. On the 9th of April, 1806, the Legislature of the State of New York passed a law authorizing "the legally qualified physicians and surgeons of each county to form themselves into a society, named after the county in which it was formed, with power to choose officers, make all needful rules for the government of its members, and appoint a board of censors to examine and license all the applicants for admission into the profession in their respective counties. But no one could be admitted to an examination until he had given evidence of having studied three years with some practitioner, and had arrived to the age of twenty-one years." (See History of Medical Education, etc., by N. S. Davis, 1851). The law also provided for the formation of a State Medical Society, composed of delegates from each County Society, and permanent members not exceeding two each year chosen by the society in annual session in Albany.

The State Society was required to divide the State into four medical districts, and appoint a board of censors in each, whose duty was to examine all applicants for license to practise medicine and surgery after having studied at least three years. The law forbids any one to enter the medical profession or to practise medicine or surgery without first having procured a license from a County or State Society or a diploma from an organized medical college. County Societies were quickly organized in nearly every county in the State; and the State Society held its first meeting at the capital in Albany in February, 1807, when its organization was completed.

Two very important objects were accomplished by the foregoing law, i. e., a thorough organization of the profession throughout the State in a manner most favorable for its advancement; and the examination of all candidates for admission by practitioners of medicine without the intervention of any other class. The enactment of the law in New York was largely owing to the influence of Dr. John Stearns, of Saratoga County, Dr. Alexander Sheldon, of Montgomery County, and Hon. Wm. W. Van Ness, all of whom were

members of the Legislature at the time. Important amendments to the law were enacted in 1818 and in 1827, by which the term of medical study was extended to four years with the privilege of deducting one year in behalf of such students as had pursued classical studies one year after the age of sixteen years, or had attended one full annual course of medical college instruction. And no person was permitted to receive the degree of doctor of medicine from the Regents of the University of the State, unless he had studied medicine at least three years with some respectable practitioner, and had attended two full annual courses of medical college instruction in an incorporated medical college.

The example of New York was followed by the Legislatures of other states until prior to 1850 nearly every state in the Union had laws providing for City, County, District and State Medical Societies, and more or less for the protection of the people from the effects of imposition and ignorance on the part of those attempting to practise medicine. Though the laws of the several states were very defective in regard to protection of the people against ignorant and illegal practice, yet the frequent contact of members of the profession with each other in the County and State Societies where they were occupied in the reading of papers, the relation of cases, and the discussion of topics connected with the prevalence and treatment of diseases in their own localities, soon led them to a more thorough knowledge of each other, and the adoption of by-laws and correct ethical rules for their mutual government and private intercourse. Many of the papers and public addresses found their way into the medical periodicals or into the annual volumes of transactions of the State Societies.

Probably the most important medical society organization effected in Europe during the first half of the nineteenth century, was the "Provincial Medical and Surgical Association", organized at Worcester, England, July, 1832. It was effected by an assembly of about fifty medical men from leading provincial towns in the south part of England under the able leadership of Dr. Charles Hastings, of Worcester. The avowed objects of the Association were the cultivation

of friendly intercourse, mutual improvement and the advancement of medical science. At its second meeting, 1833, its membership numbered one hundred and forty. Its meetings were held annually in some one of the provincial towns, and were attended by a steadily increasing membership, giving rise to the publication of an annual volume of transactions containing many papers that attracted wide attention.

It was to the annual meeting of this Association in 1842 that Justus Liebig presented his celebrated paper on "Organic Chemistry in its relations to Physiology and Pathology", described in a preceding chapter. Under the judicious leadership of Dr. Hastings (afterwards Sir Charles Hastings) the Association continued to prosper until 1856, when its plan of organization was extended by provision for the organization of branches in all parts of the Kingdom, entitled to representation in the annual meetings, and its name was changed to that of British Medical Association. It was thus changed from a strictly provincial to a national organization, and has since become one of the largest and most influential medical associations in the world.

By the union of the several American states under a written constitution, making them one nation, all matters pertaining to education were left to the regulation of the individual states. Consequently while the Legislatures of the several states granted acts of incorporation to County and State Medical Societies with power to appoint censors to examine candidates for permission to practise medicine, as has been previously stated, they also granted charters for new medical colleges as often as they were requested by ambitious members of the profession. Such charters usually placed no restrictions upon the colleges, except the requirement of three years of medical study and attendance upon two annual terms of college instruction before graduation as doctors of medicine.

Each medical college was permitted to regulate its own curriculum of studies, the length of its annual courses of instruction, and its fees. Nearly all of them were without pecuniary endowments and consequently dependent upon the fees of students for their support. This led rapidly to an

active competition for students not based on an effort to see which colleges should give the most full and systematic courses of instruction, but rather which could confer the degree of doctor of medicine at the least cost to the students in time and money.

The college degree of M. D., being almost everywhere accepted as authority to practise without other examinations, the college that offered to confer it after attendance on the shortest annual courses of instruction and the lowest college fees could generally draw the largest class.

Under these conditions and tendencies the annual courses of medical college instruction were progressively shortened from six months as required by the first colleges in Philadelphia and New York, prior to 1800, to sixteen weeks or less; all semblance of a requirement of suitable preliminary education was omitted; and before the middle of the century had been reached the number of medical colleges had increased from four to forty, and the annual aggregate number of medical graduates from fifteen to more than one thousand. By nominally studying medicine three years, including two annual repetitional courses of medical college instruction of less than four months each, the student could obtain a diploma entitling him to practise, which was easier and more economical than to study with a preceptor four years and pass an examination by the censors of a County or State Society.

The foregoing conditions concerning medical education and institutions in the United States during the first half of the nineteenth century were severely criticised by leading members of the profession both in medical societies and in the medical periodicals. At the annual meeting of the New York State Medical Society in February, 1844, I, then a young delegate from the Broome County Medical Society, presented a series of resolutions "declaring in favor of the adoption of a fair standard of general education for students before commencing the study of medicine; of lengthening the annual courses of medical college instruction to at least six months with the grading of the curriculum of studies; and of having all examinations for license to prac-

tise medicine conducted by State Boards, independent of the colleges." After a brief discussion the resolutions were laid on the table until the next annual meeting of the society, and copies of them ordered sent to the several County Medical Societies in that State, and to the medical periodicals. At the next annual meeting, 1845, the resolutions were taken from the table and during a free discussion it was urged with much force that the requirements of a fair standard of education before commencing medical studies, a longer annual college term with proper grading of the curriculum, and independent examinations for license to practise in New York State alone, would only cause the students to abandon her colleges for those of Pennsylvania or the New England states.

This caused the original mover of the resolutions to offer the following preamble and resolutions:

"Whereas, it is believed that a National Convention would be conducive to the elevation of the standard of medical education in the United States, and

"Whereas, there is no mode of accomplishing so desirable an object without concert of action on the part of the medical societies, colleges, and institutions of all the states, therefore

"Resolved, That the New York State Medical Society earnestly recommends a National Convention of delegates from medical societies and colleges in the whole Union, to convene in the City of New York on the first Tuesday in May, 1846, for the purpose of adopting some concerted action on the subject set forth in the foregoing preamble.

"Resolved, That a committee of three be appointed to carry the foregoing resolution into effect."

The preamble and resolutions were adopted and the committee appointed with the mover for chairman. By diligent correspondence and discussions in the medical press, before the time for which the convention had been called arrived, a convention of delegates representing a large majority of the medical societies and colleges of all the States of the Union assembled in New York, May 5th, 1846. The

duly accredited delegates in attendance numbered about one hundred.

Dr. Jonathan Knight, of New Haven, Ct., was elected President and Dr. Richard D. Arnold, of Savannah, Ga., and Dr. Alfred Stille, of Philadelphia, Pa., Secretaries. The six following propositions were fairly discussed and adopted during the two days the convention remained in session, viz.:

1. That it is expedient for the medical profession of the United States to institute a National Medical Association.

2. That it is desirable that a uniform and elevated standard of requirements for the degree of M. D. should be adopted by all the medical schools in the United States.

3. That it is desirable that young men, before being received as students of medicine, should have acquired a suitable preliminary education.

4. That it is expedient that the medical profession of the United States should be governed by the same code of Medical Ethics.

5. That all licenses to practise medicine should be conferred by a single Board of Medical Examiners in each State.

6. That suitable laws should be enacted in each State for the registration of births, marriages and deaths, and the adoption of a nomenclature of diseases.

CHAPTER XI.

THE PROGRESS AND INFLUENCE OF MEDICAL SOCIETY ORGANIZATIONS CONTINUED; THEIR INFLUENCE ON THE PROGRESS OF MEDICAL EDUCATION, AND ON THE SUBSTITUTION OF DIRECT CLINICAL AND EXPERIMENTAL INVESTIGATIONS IN ALL DEPARTMENTS OF MEDICINE, INSTEAD OF THEORIZING AND MEDICAL SYSTEM BUILDING, DURING THE LAST HALF OF THE NINETEENTH CENTURY.

In the closing part of the preceding chapter attention was directed to the origin and formation of the American Medical Association which was completed in May, 1847, at Philadelphia, by a convention of representatives from a large majority of the permanently organized Medical Societies, Medical Colleges, Hospitals and Asylums then existing in the United States of America. It was organized as a strictly representative body, admitting one delegate for every ten resident members of the State, County and District Medical Societies, two delegates from each regular Medical College, two from the Medical Corps of the Army and the Navy, and one from the Medical Staff of each permanent Hospital and Asylum in the several States. It was therefore a truly representative national organization of the profession, and the first of its kind in any country. The Provincial Medical and Surgical Association, which was organized at Worcester, England, in July, 1832, as stated in the preceding chapter, was not reorganized on a national basis under the name of British Medical Association until 1856. The important purposes for which the American Medical Association was organized were declared to be "for cultivating and advancing medical knowledge; for elevating the standard of medical education; for promoting the usefulness, honor and interests of the medical profession; for enlightening and directing public opinion in regard to the duties, responsibilities and requirements of medical men; for exciting and encouraging emulation and concert of ac-

tion in the profession; and for facilitating and fostering friendly intercourse between those engaged in it."

The first President of the Association was Dr. Nathaniel Chapman, of Philadelphia, Professor of Practical Medicine in the Medical Department of the Pennsylvania University.

The Constitution, By-laws, Code of Ethics and Nomenclature of Diseases devised by the Convention were adopted by the Association, and in accordance therewith standing committees were appointed to consider and report at the next annual meeting on Medical Sciences; Practical Medicine; Surgery; Obstetrics; Medical Education; and on Medical Literature.

The next meeting was held in Baltimore, May, 1848, and able reports were made by all the standing committees, which, after discussion, were referred for publication in the annual volume of transactions of the Association. The report on medical education elicited much discussion and ended in the adoption of resolutions earnestly recommending a fair standard of academic or general education before commencing to study medicine; longer annual courses of medical college instruction, and a systematic grading of the curriculum of medical studies.

The reports on medical sciences and on practical medicine also turned much attention to the investigation of epidemic diseases and to sanitary measures for their prevention.

The Association continued to hold its annual meetings successively in the larger cities of the different sections of the country with entire regularity, except the two first years of the civil war, 1861 and 1862, resulting in infusing new life and activity into all the state and local medical societies already existing, and promoting the organization of new societies in states and counties where none had existed before. The increased attention given to the subject of ætiology and preventive medicine in a few years led to the organization of the American Public Health Association, and to the formation of a National Association of the Medical Superintendents of Asylums for the Insane.

The persistent demand for a higher standard of medical

education and a more systematic arrangement of studies in the medical schools, at each annual meeting of the American Medical Association, finally resulted in the holding of a convention of delegates from a large majority of the medical colleges in the United States at Cincinnati, Ohio, in 1867. After three days of free and friendly discussion, the convention adopted, with considerable unanimity, resolutions declaring that a fair preliminary education equal to a full academic or high school course ought to be required of all students before entering upon the study of medicine; and that the time of medical study should be four years, including at least three consecutive annual courses of graded medical college instruction of not less than six months each, with hospital clinical instruction during the last college year.

Moderate and reasonable as were these requirements only one medical school in the country was actually carrying them into effect at that time. That was the Chicago Medical College, now known as the Northwestern University Medical School, which was founded in 1859 on the principles recommended for all medical schools by the college convention of 1867. The next medical school that adopted the more complete system of medical instruction recommended by the college convention was that of Harvard, in Boston, 1872. Pennsylvania University soon followed, and the continued discussions in the medical societies, both state and national, and in the medical periodicals, finally developed a public sentiment that caused the establishment of state and local boards of health and examination, both for the better protection of the people against the spread of contagious diseases and against the admission of unqualified persons to the practise of medicine in any of its departments.

So effectual were the foregoing influences that before the close of the nineteenth century the requirement of a fair academic general education before commencing the study of medicine; four years of medical study, including attendance on four consecutive or graded courses of medical college instruction of not less than six months each, with ample laboratory and clinical work as essential parts of each course,

had become the established system of medical education throughout the United States of America.

The same influences were also potent in establishing more accurate clinical and experimental investigations concerning the causes of disease and the operation of medicine. The opportunities afforded for the reading of papers at the meetings of medical societies, their discussion and subsequent publication, was a constant stimulus to the more thoughtful and industrious members of the profession, which was often given direction by the offering of prizes for the best essays embodying the results of original investigations, and the appointment of committees to report on the prevailing epidemic and zymotic diseases, and on the sanitary measures required for the improvement of the public health.

So manifest were the advantages derived from the more extensive medical organizations, that the successful progress of the British and American Medical Associations was soon followed by the formation of a triennial International Medical Congress, which has brought into the most fraternal and scientific relations the members of the medical profession of all countries.

The rapid and important advancements made during the first half of the nineteenth century in pathological anatomy, physical diagnosis and organic chemistry, as detailed in a previous chapter, and the more perfect construction of microscopes in 1832, prepared the way for equally rapid advancements in the chemistry of foods and their assimilation or uses in the living body; in embryology and histology or minute anatomy, both normal and pathological; and in ætiology, especially as connected with bacteriology and the formation of toxic and antitoxic products in the progress of diseases.

The sweeping and plausible classification of all food substances into nitrogenous, or proteid, and non-nitrogenous, or carbonaceous, by Baron Liebig, the chief founder of organic and physiological chemistry, and the division of all animal tissues into nitrogenous and fatty or carbonaceous, gave rise to the purely theoretical assumption that only the nitrogenous food elements were assimilated and used for

the growth and repair of the organized structures, while the carbonaceous were used for the maintenance of animal heat by union with the oxygen furnished by respiration. At first, the union of the carbonaceous food elements with oxygen, resulting in the formation of carbonic acid and water with the evolution of heat, was thought to take place directly in the pulmonary capillaries. Hence they were called supporters of respiration and of animal heat; and various theories were invented to account for the equal distribution of the heat to all parts of the system. However, more accurate analyses of the blood in different parts of the living body and from both veins and arteries soon demonstrated the fact that instead of combustion or oxidation taking place in the lungs the blood currents passing the pulmonary capillaries simply imbibed the oxygen from the air cells and conveyed it free to the systematic capillaries in the various structures of the body, and the carbonic acid suspended in the venous blood passed into the air cells and was exhaled with the expired air. The supposed combustion or union of oxygen with the carbonaceous food elements and evolution of heat was thus transferred from the pulmonary to the systematic capillaries. But this did not diminish the general confidence of the public in the chemical theory that these elements were used in the living body only as supporters of combustion for the evolution of heat, by uniting with the free oxygen in the arterial blood, and leaving as material products carbonic acid and water. The chief elements composing this class of foods, as arranged by Liebig, were starch, sugar or glucose, gum, fat or oils, and alcohol as it exists in fermented and distilled liquors.

The four first named were well known products of vegetable and animal growth, constituting a large part of the cereal grains, tuberous roots, and many kinds of fruit; but the fifth—alcohol—though composed of the same three elements, carbon, hydrogen and oxygen, instead of being a product of vegetable or animal growth was well known to be a product of destructive fermentation, i. e., a bacteriological excretion, and capable of producing very different effects on the human body than by any other recognized ele-

ment of food. While the placing of alcohol at the head of the class of carbonaceous foods by Liebig greatly encouraged its popular use in all the countries of Europe and America, its correctness was challenged by several men eminent in the departments of chemistry and physiology. It was soon demonstrated by the experiments of MM. Tiedemann and Gmelin, Bouchardat and Sandras, John Percy, Christison and others, that when alcohol was taken into the stomach diluted as in fermented and distilled liquors, it was directly absorbed by the portal veins unchanged and passing through the liver and lungs was speedily detected in the arterial blood, the liver, lungs and brain, and in the urine and exhaled breath. They found none, however, either in the lacteals, the chyle or in the thoracic duct.

Sir Benj. Brodie found it was readily absorbed and produced its usual effects after the thoracic duct had been tied; and Dr. Prout, of London, clearly showed that while it was present in the blood the amount of carbonic acid or carbon dioxide in the air exhaled from the lungs was notably diminished. And Böcker, of Germany, demonstrated by a patiently executed series of experiments that the presence of alcohol in the living body diminished the sum total of excretions and eliminations therefrom.

Notwithstanding all these evidences that the behavior of alcohol in the digestive organs was wholly unlike that of any other known food, either carbonaceous or nitrogenous, and that its presence in the blood diminished both the exhalation of carbon dioxide and tissue metabolism, they were given but little attention, and alcohol was continued at the head of the list of heat and strength producing foods by nearly all contributors to medical and general literature. And almost every family was induced to keep on hand some kind of alcoholic liquor, if not for daily use yet to meet the emergencies of exposures to cold or wet or excessive fatigue or special weakness from any cause. Consequently faith in the power of alcohol to warm and strengthen the living body became thoroughly fixed in the popular mind; and all of its evil effects were attributed to its abuse. In other words, it was claimed by Liebig and his chemico-phys-

iological folowers, that alcohol in moderate doses was a true strengthening and heat-producing food, and became an anæsthetic or paralyzing agent only when taken in large doses. The same physiological distinction between the influence of small, or moderate, and large doses was soon extended to nearly all known anæsthetic and narcotic drugs; thus introducing into all our works on therapeutics and practical medicine the paradox in drug action, viz., that in moderate doses they were stimulating, supporting and warming and in larger doses, sedative, narcotic and paralyzing.

Being dissatisfied with this alleged antagonistic action of small and large doses of the same drugs, and wholly unable to reconcile the doctrine of Liebig concerning the entire separate action and uses of the nitrogenous and carbonaceous classes of food, either with the results of investigations already mentioned or with the well known facts that whole classes of people in different countries lived almost wholly on carbonaceous foods and yet were robust and strong, and that laboring men who took daily a regular ration of alcoholic drink accomplished less work and suffered more from sickness than total abstainers working side by side with them, (see brick-makers work in British and Foreign Medico-Chirurgical Review for Oct., 1847), I decided to institute further experimental investigations, for the purpose of determining more reliably the sources of animal heat in conditions of health.

For this purpose during the years 1849 and 1850 I devised and executed five series of experiments. The first was for determining the actual variations in the temperature of the body during the 24 hours while taking an ordinary mixed diet and the usual exercise, and the coincident variations in the pulse and amount of exhaled carbon dioxide. During two weeks the temperature, as indicated by a delicately graduated thermometer bulb under the tongue, was recorded six times each day, i. e., at 7:30 A. M., before breakfast; at 10: A. M., two hours after breakfast; at 12:30 P. M., before dinner; at 3. P. M., two and a half hours after dinner; at 5:30 P. M., before supper; and at 8. P. M., two hours after supper. At the same hours a rec-

ord was made of the proportion of carbon dioxide in the exhaled air. The records of each day uniformly showed the lowest temperature at 7:30 A. M., after the long fast of the night, an increase of about 2° F. during the two hours after breakfast; then a gradual decline until after dinner, when it increased again, attaining the highest temperature at 3. P. M., two hours after dinner; then receding slowly until the supper, when another but less degree of rise took place; thus showing that in a strictly healthy condition, and on an ordinary mixed diet of animal and vegetable food, the temperature of the human body uniformly rises from 1° F. to 2° F. during the period of active digestion and assimilation of food and returns to the minimum during fasting. The same records, however, showed that the variations in the quantity of carbon dioxide exhaled from the lungs were not parallel with the variations of temperature; the greatest amount exhaled daily being from 3. P. M. to 6. P. M., then decreasing slowly until 10 A. M.

Having thus ascertained the actual temperature and the ratio of carbon dioxide in the exhaled air and their daily variations under an ordinary mixed diet, the same individual made the same observations and records with the same instruments during three consecutive days on a diet exclusively carbonaceous, consisting of starch and white sugar. Then after living on the usual mixed diet one week, the same observations and records were made with the same appliances during three days on a diet exclusively nitrogenous, consisting of egg albumen carefully separated from the yolk.

The records of both these series of observations showed the same increase of temperature during active digestion after each meal as had been recorded under a mixed diet. The only difference was that the temperature rose more rapidly after each meal of starch and sugar, and slower after the meals of albumen, plainly on account of the more rapid digestion of the carbonaceous food, for the average daily temperature under the exclusively carbonaceous diet was .5° F. lower than under either the mixed or exclusive proteid food.

The fourth series of observations and records were made to determine the effects of alcohol on the temperature, pulse rate, and exhaled carbon dioxide. To prevent the results from being complicated by the coincident action of other food the time chosen for commencing the experiments with alcohol was nine o'clock in the evening, three hours after the evening meal. After noting the temperature, pulse rate, and the ratio of carbon dioxide exhaled, four ounces of brandy were taken at once diluted with water. In less than fifteen minutes a sense of heat was felt in the stomach and face, with a feeling of mental exhilaration and less consciousness of external impressions and at the end of one hour the temperature was not appreciably altered, the pulse had increased five beats per minute, and the amount of carbon dioxide being exhaled had diminished. At the end of two hours the temperature had diminished .2° F., the pulse had returned to its natural frequency, and the ratio of carbon exhaled was still less than at the beginning.

At the end of three hours the temperature had fallen .5° F., while the pulse and ratio of exhaled carbon had returned to the natural standard before the brandy was taken, but the benumbing effect on the brain, mental faculties, and voluntary muscular movements was still obvious.

A few evenings later the experiment was repeated with about the same quantity of alcohol in the form of port wine, and with the same results in all respects.

The foregoing records, so far as they relate to temporary increased frequency of pulse and diminished exhalation of carbon dioxide, are in strict accord with those previously recorded by Prout, Bouchardat and Sandras, but they constituted the first clear demonstration that the presence of alcohol in the human body reduced the temperature, and lessened the sensibility of the nervous structures generally; effects entirely different from those obtained from the taking of any other known food, either carbonaceous or proteid.

The fifth experimental inquiry related to the origin and uses of the fibrin of the blood, which up to that time, 1850, had been universally regarded as the most perfectly assimilated constituent and used for the growth and repair of the

fibrous and muscular structures of the body. Yet the numerous analyses of blood by Andral, Gavaret, Rodier, Simon and others, had shown that the relative proportion of fibrin was greatest during the progress of acute inflammations, when digestion and assimilation were much diminished; in protracted anæmia; and even in the advanced stage of pulmonary tuberculosis when emaciation was progressing most rapidly.

These facts were inconsistent with the claim that the fibrin was a direct product of food assimilation, and suggested the inquiry whether it might not be a product of retrograde tissue metabolism. Indeed, Simon had suggested that the fibrin was derived from the disintegration of the red corpuscles and in his work on the "Chemistry of Man" page 139, he gives the results of analyses of the blood from the aorta, and from the renal and hepatic veins of a horse, showing very marked diminution of the fibrin in the blood returning from the actively excreting organs. It was stated, however, that the horse was not in a healthy condition and the amount of blood from the renal vein not sufficient for a satisfactory analysis. Regarding the question as important, I secured an ample supply of blood from the iliac artery, the iliac vein, and the renal vein of a healthy dog and subjected each specimen to a careful analysis by which it was shown that the blood in the iliac vein contained notably more fibrin than that from the artery, while that from the renal vein contained very much less, thereby showing clearly that the blood while passing through a muscular and non-secreting structure gained in its proportion of fibrin, and the reverse in passing through an actively excreting organ.

The results of all the foregoing series of experimental investigations were embodied in an essay entitled "An Experimental Inquiry concerning some points in the Vital Processes of Assimilation and Nutrition", and read in the annual meeting of the American Medical Association, at Charleston, S. C., May, 1851.

The general conclusions set forth by the essayist were "that the carbonic acid of the respiratory process, like the secretions of the skin and kidneys, is a true product of the

metamorphosis of the structures of the body, while the temperature depends directly on those changes which take place in the nutritive and organic actions;" * * * "that all digestible substances, whether carbonaceous or nitrogenous, are assimilated and appropriated with more or less facility to the nourishment of the organized structures of the body;" * * * "that alcohol produced none of the effects of food, but permeated the blood and tissues like other well known drugs; and that the fibrin of the blood was a product of tissue waste to be eliminated by the kidneys and perhaps other excretory organs." The essay was listened to attentively and a vote of thanks tendered, but its facts and inferences were so directly opposed to the then popular chemico-physiological doctrines, that no vote for publication was passed. It was, however, published in full in the Northwestern Medical and Surgical Journal, Chicago, September, 1851, pp. 169-190.

In the autumn of 1852, aided by Dr. Henry Parker, then a resident of Chicago, I repeated and varied my experiments concerning the effects of alcohol in the form of both wine and brandy, noting more particularly its effects on the functions of the cerebro-spinal nervous systems, both voluntary and involuntary, in addition to that of respiration and animal heat. The results obtained fully sustained the correctness of the conclusions stated in the essay of 1851, and they were used by Dr. Henry Parker as the basis of his "Prize Essay on the Difference between Stimulants and Tonics", presented to the annual meeting of the Illinois State Medical Society, in La Salle, 1854, and published in the volume of transactions for that year. At this time an eminent physician of Boston suggested that inasmuch as the moderate use of alcoholic drinks lessened tissue waste and favored the accumulation of fat, their use might be of value in the treatment of pulmonary tuberculosis and other wasting diseases. The suggestion was received with favor, and during the first two decades of the last half of the nineteenth century cod-liver oil and Bourbon whiskey were the most popular remedies both for the prevention and cure of pulmonary tuberculosis.

On this account I was led to commence making full record of every well marked case of pulmonary tuberculosis that came under my care, both in hospital and private practice, of which a reliable account could be obtained concerning the use of alcoholic drinks both before and during the progress of the disease. During the four years intervening between 1855 and the end of 1859, I had accumulated full notes of 210 cases, of whom 140 were males and 70 females. Of the whole number 68 had used some form of alcoholic drink almost daily from one to twelve years before any symptoms of tuberculosis were observed. Some had drunk only beer at the rate of three or four glasses a day; some had drunk chiefly wine; and a larger number had taken all kinds of liquor. They were all habitual drinkers, yet only 15 were recognized as drunkards. Ninety-one were periodical or irregular drinkers of alcoholic liquors, but rarely became intoxicated; and 53 had been total abstainers from alcohol through life. Many of those belonging to the class of habitual drinkers were in such circumstances, and with such habits as were as favorable for testing the influence of alcohol on the development of tuberculosis as could have been devised. But instead of affording evidence of any preventive or retarding influence, the use of alcohol appeared to both favor attacks of the disease and to hasten its progress towards a fatal termination. The cases in all their bearings were included in a paper read in the Medical Section of the American Medical Association at its annual meeting in New Haven, Conn., May, 1860, and published in the volume of transactions of the Association for that year.

At the annual meeting of the American Medical Association in May, 1857, Dr. Wm. A. Hammond, then a member of the Medical Staff of U. S. Army, presented an essay to which was awarded a prize, and which embraced a full account of the effects of living ten consecutive days exclusively on albumen and water, and at another time on nothing but starch and water. During the diet of albumen he lost five pounds in body weight but without any loss of temperature. During the ten days on starch alone he lost no body weight and gained slightly in temperature. His con-

clusions were "that albumen may be assimilated into the system in such quantity as to afford a sufficiency of both nitrogen and carbon for the organism;" and "that starch can be assimilated by the absorbents in more than sufficient quantity to sustain the respiratory function." In other words that both albumen and starch were capable of assimulation and use as food for the organized structures of the body (see Trans. of Amer. Med. Association, Vol. 10, p. 511, 1857). Subsequently Dr. Hammond instituted valuable experiments with alcohol, first on the dog, and afterwards on himself. When he introduced alcohol diluted with water into the stomach of a dog it was quickly absorbed and readily detected in the blood, the various organized structures of the body, in the urine, and the exhalations from the lungs.

He executed three series of experiments on himself not by attempting to live on alcohol alone, as in the experiments with albumen and starch, but by taking for five days four drachms of alcohol diluted with an equal quantity of water in connection with each meal of ordinary food. During each of the three experimental series of five days he found the amount of carbon dioxide and water exhaled notably diminished; the urine decreased both in quantity and in solid constituents; pulse increased in frequency; decided headache with sense of heat in the surface, and indisposition to exertion either physical or mental; but at the end of each five days he had increased a few ounces in weight. These results showed very plainly that the alcohol, instead of acting as respiratory food, actually diminished the sensibility of all the nervous structures as an anæsthetic, and retarded the metabolic and excretory functions. An account of Dr. Hammond's experiments may be found in his Treatise on Hygiene published in 1863.

During the years 1865-66, Dr. Benj. Ward Richardson, of London, was led to test by accurate experiments the effects of alcohol on the temperature of the human body, and was surprised to find that it uniformly reduced the same in direct proportion to the quantity used. He embodied the results of his investigation in a paper presented in the meeting

of the British Association for the Advancement of Science, at Birmingham, in 1866. After some discussion the paper was regarded with so much incredulity that it was returned to its author for further investigation; a fate very similar to that awarded to my own paper by the American Medical Association at Charleston, S. C., fifteen years previous, but concerning which Dr. Richardson evidently had no knowledge. His paper, however, was soon published and attracted much attention both in Europe and America; and a large part of his subsequent life work was devoted to further investigations, public lectures and publications, advocating more correct views concerning the nature and effects of alcohol on the human system in health and in conditions of disease. He gained a very high reputation in both literature and science, and died Nov. 21st, 1896, as Sir Benjamin Ward Richardson, in the 69th year of his age.

Since the foregoing investigations by myself, Dr. Hammond and Dr. Richardson every aspect of the influence of alcohol on the human system and on both animal and vegetable life, in small doses and large doses, aided by every instrument and device of modern invention designed to secure accuracy of results, has been thoroughly investigated by Professors Martin, Hammerton, Eagleton and Gibbs of Johns Hopkins University; Drs. E. T. Reichert, David Cerna, J. H. Kellogg, Beaumont, Chittendon and Mendel, C. F. Hodge, Berkley and Friedenwald, A. C. Abbott, I. H. Orcutt, H. C. Wood and Prof. Atwater, in this country. And in Europe by Parkes, Anstie, J. J. Ridge, Ringer and Sainsbury, Kraepelin, George Harley, Lauder Brunton, Lionel Beale, E. Destree, Galzinski, Romanes and Krukenberg, F. W. D'Evelyn, Mohilinski, Charles Fere, Branthwaite, H. Frey, Delcarde, Max Kassowitz, Laitinen and others. A careful review of the experimental work of all the investigators heretofore named, shows with perfect clearness that alcohol as it exists in fermented and distilled liquors, instead of being digested and assimilated in the digestive organs like sugar, starch and fat or other carbonaceous food substances, is absorbed unchanged and is carried in the blood to every part of the living body the same as ether, chloro-

form, morphine, nicotine and other anæsthetic and narcotic drugs. That while present it lowers the temperature; diminishes the activity of natural metabolism; lessens the force and efficiency of the circulation and respiration; impairs the functions of all nerve structures, both sensory and transmitting, and thereby diminishes the acuteness of the special senses and the activity of mental processes in direct proportion to the quantity used. Also, that it impairs the corpuscular elements of the blood, lessens the activity of the leucocytes, and favors tissue degenerations in the direction of fatty, fibroid and sclerotic changes; that it diminishes every force or energy known in a living body, i. e., muscular, nerve, mental, heat and vital or protoplasmic force, and thereby directly lessens the natural vital resistance to all toxic and disease producing agents and extends the same from parent to offspring. Like all other general anæsthetic and narcotic drugs in large doses it destroys life by paralyzing the functions of respiration and circulation, and in small daily repeated doses it lessens both mental and physical activity and endurance, and yet deceives the individual by lessening the sensibility of his material seat of consciousness in the brain.

The important bearing of the foregoing facts on the public health and morals is only beginning to be appreciated at present, but before the end of the twentieth century the numerous investigations by which they have been established will be regarded as among the most important that have characterized the progress of medicine during the last half of the nineteenth century of the Christian era.

CHAPTER XII.

HISTORY OF MEDICAL PROGRESS DURING THE LAST HALF OF THE NINETEENTH CENTURY COMPLETED. THE PRESENT STATUS OF MEDICAL INVESTIGATIONS AND PROGRESS, AND THE INDICATIONS OF FURTHER ADVANCEMENT.

The brilliant and important advancements in organic chemistry under the leadership of Liebig in Germany; in pathological anatomy and physical diagnosis in France; in the physiology of the nervous system in England; and in anæsthesia in America during the first half of the nineteenth century, were all accomplished by close observation and diligent experimental application of chemical and physiological laws, with but little aid from the microscope. But they paved the way and furnished an excellent basis for the no less brilliant achievements of the last half of the same century. The compound microscope was brought to a degree of completion in 1832 that enabled other investigators to take the several primary structures of the anatomists and resolve them into the individual cells or organized atoms of which they were composed, thereby showing the manner of their evolution or growth, and developing the interesting departments of histology and embryology.

Under the leadership of Thomas Schwann, Lionel S. Beale, Louis Agassiz, Sharpey, Hassall, Bastian, Tyndal, Huxley, Virchow, and others, every organized structure of the living body was subjected to microscopic analyses and found to be composed of individual cells, varying in size and shape, and performing a great variety of functions, but all composed essentially of an organizable substance recognized as the physical basis of life, and called by some investigators protoplasm and by others bioplasm. Its most distinctive attribute is its vital capacity to grow and multiply or propagate itself. Thus they found all living bodies, both animal and vegetable, composed of protoplasm aggregated in minute forms called cells, and united in various ways to constitute all the organized matter in the fluids and solids of

living bodies,—a beautiful histological demonstration, that may well remind us of the crude theory of atoms and pores taught by Asclepiades and his pupil Themison, one hundred and fifty years before the commencement of the Christian era.

The modern investigators did not limit their microscopic analyses to normal structures, but extended them with equal diligence to all the morbid structures and products brought to light by the studies in morbid anatomy during the first half of the century. This soon resulted in demonstrating that all tumors or morbid growths were cellular in structure, and progressive by constant evolution of new cells; and the so-called inflammatory exudations, whether plastic or aplastic, were also composed of cells derived from the blood and tissues. The plastic exudations were found to consist largely of white corpuscles or leucocytes, formerly called migrating corpuscles. They were seen to attack and apparently consume such offending matter as they met with, and soon after to disappear leaving the structure in its normal condition, or if their accumulation was too great or persistent, they united in the formation of adventitious tissue by which thickenings, indurations or adhesions might remain for indefinite periods of time. If the exudations were aplastic from the presence of pathogenic bacteria, or their toxic products, the vitality of the accumulated leucocytes was overwhelmed and they, with the cells of the tissues, were degenerated into pus corpuscles with more or less destruction of tissue by ulceration, suppuration or gangrene.

From all the foregoing investigations the eminent German pathologist, Rudolph Virchow, was enabled to give to the world his great work on cellular pathology (Cellular Pathologie) published in 1858, which was translated into French by Picard and into English by Frank Chase in 1860.

While one class of investigators was thus successfully using the microscope to enable them to see more clearly the composition and modes of development of living organized structures, both in conditions of health and disease, and thereby creating anew the important departments of normal and pathological histology, another class consisting of J. K.

Mitchell, Saulsbury, Sanderson, Beale, Lister, Pasteur, Koch, Sternberg, E. Hallier, and many others, both in Europe and America, were applying the same instrument with equal diligence in the domain of ætiology, searching for long-hidden causes of disease.

In all the earlier periods of medical history most of the febrile and inflammatory diseases were attributed to the concoction or fermentation of the blood and other so-called humors in the living body. Later, by observation alone, the concoctions causing the active phenomena of diseases were traced in some instances to something emanating from moist soils rich in decomposable vegetable matter and exposed to high temperature. Other cases were traced to the influence of the air in over-crowded and ill-ventilated houses and the use of impure water. By long-continued observations the profession became satisfied that the combined influence of heat, moisture and decomposable vegetable matter in the soil, gave rise to a subtle toxic agent capable of impregnating both air and water, that was called Malaria or Koinomiasm. By similar observations it was made evident that both air and water, when impregnated with the excretions and eliminations from living animal bodies, became toxic and capable of producing a variety of severe and often fatal febrile diseases. When the science of analytical chemistry had reached a high degree of development, many samples of supposedly impure soil, water and air were subjected to rigid chemical analysis, hoping thereby to isolate and identify the specific toxic agents called miasms, but without success. But when the same substances were properly placed in the field of the microscope an abundance of living germs, called bacteria, were discovered and found capable of propagation on suitable media in the laboratory. Copeland and a few earlier writers under the phrase "contagium vivum" had suggested that the specific causes of some epidemic and contagious fevers consisted of sporules or fungi; and in 1849 Dr. J. K. Mitchell, of Philadelphia, published a very interesting monograph on the subject. He was followed by Dr. Salsbury, of Cleveland, Ohio, in 1866, who published two papers, giving the results of his own investigations con-

cerning a vegetable fungus called palmella. Still later Drs. Klebs, and Thomasini Crudelli, of Italy, experimented with a fungoid growth found in the malarious soils near Rome that they called bacillus malariæ, and claimed to have demonstrated its causative influence by inoculating rabbits with it. Their conclusions, however, were not sustained by a thorough experimental investigation by Dr. Geo. M. Sternberg, U. S. A., in a highly malarious district in Louisiana. Laveran and others extended their examinations to the blood of patients during the active progress of malarious fevers, and soon identified the supposed specific cause in the red corpuscles of the blood in the form of the plasmodium malariæ.

When, during the decade following 1860, it was shown by Huxley, Beale, Bastian and others that microscopic germs or fungi pervaded the atmosphere and were greatly increased both in number and variety in the air of over-crowded and unventilated rooms; and the process of fermentation was shown by Pasteur to be one of bacteriological development, not a few of the investigators regarded the bacteria as the product of spontaneous growth. Bastian published a large work in support of that doctrine. But all his positions were soon completely refuted by the further investigations of Huxley, Pasteur, Beale, Virchow, and others, showing that in all instances living germs are developed only from preceding germs. They proved conclusively not only that "like begets like", but also that every living cell and germ, whether vegetable or animal, is evolved from a preceding cell or germ.

In 1835 Bassi and Belasma discovered the silk worm fungus, and in 1855 Polender discovered the bacillus of malignant pustule. In 1847 Joseph Leidy, of Philadelphia, demonstrated the existence of the trichina spiralis, previously described by Richard Owen, in pork, and its communicability to man. During the decade following 1860, Pasteur demonstrated fully that without the presence of micro-organisms there could be neither fermentation nor decay. It was during the same period of time that Devaine proved his previously discovered germ in the blood of an-

imals suffering from anthrax to be the cause of that disease; and Oertel discovered fungi in the exudations accompanying diphtheria, which were more accurately described later by Klebs and Loeffler as bacilli.

Early in the next decade (1873) Obermeier discovered the spirochæte in the blood of recurrent fever patients, and Joseph Lister prosecuted his investigations concerning the micro-organisms of suppurating wounds, erysipelas, and septicæmia, by which he was enabled, in 1878, to propose a system of antiseptic surgical practice that speedily effected a most beneficial revolution in the treatment of all wounds and surgical diseases.

The decade following 1880 was equally remarkable for the microscopic achievements in the department of ætiology. It was at the beginning of that decade the announcement of the fungus of actinomycosis by Bottinger began to attract attention, and Prof. James Law, of Ithaca, N. Y., demonstrated its existence in 1883. The following year Drs. W. T. Belfield and J. B. Murphy presented two well-marked cases of the disease in the human subject, before the Chicago Medical Society, and the specific microbe was identified by Drs. Belfield and Fenger.

In 1885 Pasteur commenced his inoculations for preventing hydrophobia in human subjects.

In 1886, Koch announced his discovery of the cholera bacillus; in 1887 the bacillus of tuberculosis, and that of tetanus soon followed. The pneumococcus of pneumonia was announced by Friedlander; and before the end of the century the numerous workers in the field of bacteriology had claimed nearly all the diseases in the catalogue of human ailments as resulting from pathogenic germs of some form.

Apparently the first thought excited by all the foregoing discoveries, both in relation to surgical wounds and to disease-producing bacteria, was the practical application of antiseptics and germicides for the destruction of the offending germs. Consequently the shelves of the apothecary shops, both wholesale and retail, speedily became loaded with a great variety of antiseptics, germicides and antitoxins, for both external and internal use. Clinical experience in their use soon dem-

onstrated that by the external applications a much greater degree of cleanliness, of both patients and their surroundings, was secured, and corresponding improvements in the results of all external dressings and surgical procedures. But the same experience with their internal use, for the purpose of destroying either the bacteria or their toxins already existing in the blood or tissues, resulted in only a limited degree of success. As soon as the bacteriologist announced the discovery of a pathogenic germ, or its toxin, as the cause of any acute disease, the clinician began to administer his germicide or antitoxin in all stages of the disease, regardless of the previously well known laws of development, progress, and decline, in all acute diseases.

Every pathogenic germ or toxin discovered was declared to be a contagious or infectious agent, to be either avoided by isolation or directly combatted by specific germicides or antitoxins.

And thus the nineteenth century closed with the medical profession throughout Christendom engaged in a determined effort to discover the specific causes of diseases and their specific remedies, aided by all the modern facilities and appliances for ensuring accuracy in the domain of scientific research.

The results thus far have been a great increase in our knowledge of the causes of disease, both specific or exciting and predisposing, and corresponding advancements in the field of sanitary or preventive medicine. For the more extensive and accurate our knowledge of ætiological agents, whether in air, earth, or water, the more successfully can sanitary measures be devised for their avoidance or destruction.

But the administration of specific remedies for the purpose of arresting the progress of active or acute diseases caused by specific germs or toxins has been attended by only a limited degree of success. This remark applies to the use of both chemical antiseptic drugs and organic extracts or antitoxic sera. In their zeal both laboratory investigators and clinicians apparently overlooked the fact that all acute febrile diseases are characterized by a stage of incubation,

a prodromic or forming stage, a stage of active progress, and a stage of decline or death. So too, all the well known pathogenic bacteria that cause febrile attacks have a period of incubation after they are introduced into the living body, followed by a period of rapid multiplication, during which they commence the evolvement of a toxic ptomain that becomes the direct excitor of the active phenomena of disease, and continues the same until overcome by the natural processes of vital resistance or the life of the patient is extinguished. A careful review of all the facts thus far recorded shows clearly that the administration of germicides, antitoxins and immunizing agents has been attended by a fair degree of success when they were used during the stages of incubation and of initial febrile symptoms, but with a rapidly decreasing effect during the subsequent stages of the disease. So true is this that three-fourths of the life-saving influence attributed to the use of anti-diphtheritic serum has resulted from its administration during the incubative stage and first twenty-four hours of fever.

So early as 1860-62, Dr. G. Polli, of Milan, demonstrated by a reliable series of experiments that putrid and actively poisonous animal matter, injected into the blood or tissues of healthy animals, could be rendered harmless by injecting at the same time efficient doses of hypo-sulphite of lime or soda. From this many inferred that the same remedies might be used successfully in the treatment of all diseases caused by animal or organic poisons. Consequently the hypo-sulphites were soon tried in all stages of erysipelas, smallpox and other eruptive fevers, but with no decided success, except in a very few cases in which they were given during the period of incubation. Very similar results followed the experiments of Dr. Daniel Brainard, of Chicago, from which he was induced to propose the use of iodine as an antidote for the poison of reptiles.

Indeed, an abundant clinical experience has shown that after bacteriological infection has fully developed in the living body, thereby establishing active febrile phenomena, it is effectually neutralized or expelled only by the natural processes of vital resistance, recognized as oxidation, phag-

ocytosis, anti-toxic evolution and excretion. Therefore what we now most urgently need is more knowledge concerning these natural processes of vital resistance, and how to aid them in either destroying or expelling each infectious agent after it has multiplied itself and established the active phenomena of disease.

Let the clinical observer and the laboratory investigator unite in the work of ascertaining more fully the changes any given toxin or infectious agent produces in the constituents of the blood, the tissues in which it manifests a disposition to accumulate, the changes it undergoes, if any, by oxidation, its effect on metabolism, and the excretory channels through which it is finally expelled from the living body. Then will the enlightened practitioner be enabled to so adjust the use of his remedies during the active progress of disease as to aid the natural processes and render recoveries more certain and more perfect.

It was in urging substantially the foregoing views that the present writer closed the general Address on Medicine before the annual meeting of the American Medical Association, in 1890, in the following words:—

"If we would reach the highest degree of success in the treatment of acute general diseases, we must keep distinctly in mind the following propositions:—

"1. We must as early as practicable separate the patient from the further action of both the specific and the predisposing causes of his disease by surrounding him with pure air and as perfect sanitary conditions as possible; and as the living animal system uniformly tends to either destroy or eliminate the specific morbific causes by its own metabolic changes, we should carefully avoid the use of such remedies as either directly or indirectly retard or prevent such normal metabolic processes, even for the repression of one or more prominent symptoms. On the contrary, we must use such general alterative and antiseptic remedies as are known to sustain and correct such processes, and thereby aid in hastening the destruction or elimination of the disturbing materies morbi, whether they consist of living germs, chemical pto-

maines or leucomaines, or only excretory matters abnormally retained in the system.

"2. As the pyrexia or high temperature results mostly from interference with the processes of heat dissipation, especially in the ordinary continued fevers, we must further aid in restoring these processes by gently promoting natural elimination and the direct abstraction of heat by sponge baths, and in excessive cases by wrapping in the cold wet sheet, all of which exert a restorative influence on the vasomotor, cardiac, and respiratory nerve centres, while, with equal care, we avoid administering such doses of internal antipyretics and alcoholics as diminish heat production by retarding both blood and tissue metabolism, and equally depress nerve sensibility and force.

"3. Again, as every specific cause capable of producing the complex assemblage of morbid phenomena that constitute a general fever, has displayed a tendency to induce special local morbid conditions in some one or more of the important tissues or organs during the progress of the general disease, as in the glands of the ileum, mesentery and spleen in typhoid; the stomach, duodenum and liver in periodical and yellow fevers, etc., we must early and accurately use such remedies as palliate or modify these local developments wherever they may be manifested, and thereby prevent such structural changes in these directions as might otherwise end in fatal exhaustion.

"4. Finally, as all acute morbid processes, when established, are progressive through the successive stages of increase, culmination and decline or destruction of the patient, we must carefully adjust both our remedial agents and nutrient materials to the actual stage of progress of the disease and the capacity of the patient to receive and appropriate the same; ever remembering that the same remedial agent that might be of great value in the first stage, might be injurious or even destructive if used at the stage of culmination, or still more in that of decline. Hence specific remedies for acute general diseases can be rationally or successfully used only when aimed at the destruction or elimination of the specific causes and in the first stage of the

morbid processes. Indeed, the chief benefits thus far derived from the use of antiseptics and germicides, have been as preventives in the incubative and prodromic stages, rather than as curatives after active morbid processes have become manifest."

The zealous investigators of morbid anatomy and pathological processes during the first half of the nineteenth century have often been accused of treating the diseases instead of their patients. With equal propriety their successors who emphasize the paramount importance of pyrexia and heart-failure, may be accused of treating symptoms without due regard either to the patient or his disease. And with still greater propriety may the profession of the present time be criticized for treating the specific causes of diseases instead of the patients, their pathological conditions, or even their most important symptoms. Is it not possible to so educate the medical practitioners of the twentieth century that they will comprehend more clearly the nature of each department of medical knowledge, and its true relations to every other department; and thereby enable them to avoid the partial, one-sided, extreme, and often contradictory practices that have marred the pages of all past medical history?

The all-absorbing investigations in search for the specific causes of diseases that have characterized the last two decades of the nineteenth century, have resulted in many brilliant and important discoveries in the department of ætiology, and have laid the foundation for corresponding improvements in prophylaxis, immunity and preventive medicine. These have already notably diminished the ratio of prevalence of several important diseases, and thereby added to the average duration of life.

But the very common assumption that each acute disease can have but one pathogenic germ as a specific cause; and that when the same disease or pathological condition, clinically identical, is produced by another germ it must be regarded as a pseudo, or false, disease, is neither justifiable nor in accordance with well ascertained facts.

It is well known that from ten to twenty per cent. of all cases of well marked clinical diphtheria exist without

the presence of the Klebs-Loeffler bacillus. So also many cases of pneumonia occur and run their course without the presence of the specific pneumococcus, and cases of inflammation, suppuration, and septicæmia are recognized as caused by several well known pathogenic bacteria. Therefore, instead of multiplying names for the same diseases or pathological conditions by making the presence or absence of some one germ or toxin the sole diagnostic test, it would be productive of far better results if the chemico-physiologists, bacteriologists and sanitarians continued to recognize the various well defined diseases as they were clearly differentiated with so much labor and accuracy by the pathologists and pathological anatomists of the first half of the century, and continued their search, not for one specific germ or toxin for each disease, but for all the germs or toxins that may be found connected with it and their relative importance. Then let them go one step further and show how, by what processes, and through what channels, the germs or toxins already developed and producing disease are finally destroyed or expelled from the system. By so doing they would not only preserve the true relations of ætiology to pathology, but also furnish us the proper basis or reliable indications for the rational treatment of the active stage of acute diseases.

In the meantime, the experimental therapeutists should demonstrate, by strictly scientific methods, the action of all drugs and therapeutic agents when introduced into the living body, and the changes in structure or function they are capable of producing. Then would the practitioner be able to choose the remedies best adapted for relieving the actual pathological conditions at each stage in the progress of the diseases he treats; and he would be able to so adjust them as to aid the natural processes of vital resistance in curing diseases.

Much has been done in this direction during the last half century, especially in regard to the true action of the narcotic and anæsthetic drugs, as detailed in the last preceding chapter. Much, however, still remains to be done. And there is much need of applying the same methods of inves-

tigation for determining the effects of the habitual use of all the important articles of food and drink and of the various occupations in modern life. For while acute diseases may arise chiefly from bacteriological and toxic agents, those chronic, slowly-developed, and structural diseases so prevalent in civilized communities, have their origin from moderate but frequently repeated or persistent impressions on the organized elements of the blood and on the protoplasm and metabolism of the tissues, by such agents as tea, coffee, tobacco, fermented and distilled alcoholic drinks, and other anæsthetics, and living or working in close, ill-ventilated rooms, with deficient open air exercise. It has already been fully demonstrated that the habitual use of several of these agents cause impairment of the corpuscular and hæmoglobin elements of the blood, and degenerations of structure in the various tissues and organs of the body, and thereby materiallly shorten the duration of life. And is it not possible, or even probable, that further investigations would show that the same agents, aided by such modes of living and occupations as rendered the blood habitually less oxygenated and decarbonized than natural, were capable of causing morphological changes in some of the non-pathogenic germs that are always found in the human body, sufficient to convert them into pathogenic germs of great importance? If the persistence of bad hygienic and sanitary influences may so modify cell proliferation as to cause either morbid growths or tissue degenerations; or so modify germinal cells as to cause the transmission of hereditary diseases, why not the same or similar influences change a common colon bacillus into a typhoid or tuberculous bacillus?

The whole field of what has been vaguely termed predisposing causes of disease, though temporarily neglected on account of the zealous search for specific causes and specific remedies, would richly repay a thorough investigation and would effectually bring the profession back to a recognition of the patient as well as of his diseases and the causes that produce them.

It will be seen by the foregoing observations that notwithstanding the many brilliant discoveries and important

advancements in all departments of medicine and surgery during the nineteenth century, there are still remaining ample fields in which the investigators of the twentieth century may gain equal renown and the human race even greater benefits. And it would render such a result much more certain if a study of medical history were added to the curriculum of every medical school. For, in the language of Hippocrates, "the physician must know what others have known or he is constantly liable to deceive both himself and others." The very general neglect of this, especially during the last three centuries, has caused the education of each generation of medical men to be limited almost entirely to the popular views and practices of their own time, without any adequate knowledge of those entertained and practised by their predecessors.

This has led to the unnecessary duplication of work in many directions; to the complaisant exaggeration of the importance of present discoveries and practices compared with those of preceding periods; and to the very imperfect perception of the inter-dependence of medical advancements in all ages with the coincident advancements in all other natural and physical sciences.

CHAPTER XIII.

MEDICAL EXCRESCENCES OR BRIEF NOTICES OF THE MORE INFLUENTIAL MEDICAL SECTARIAN DOGMAS THAT HAVE ATTRACTED MORE OR LESS PUBLIC ATTENTION DURING THE EIGHTEENTH AND NINETEENTH CENTURIES. THE ORIGIN OF SO-CALLED "SCHOOLS OF MEDICINE"—HOMEOPATHY; THOMSONIANISM; BOTANICO-MEDICAL; ECLECTICISM; CHRISTIAN SCIENCE; OSTEOPATHY, ETC.

In the preceding chapter was completed a brief history of the origin, development and progress of the science and art of medicine and its relations to the progress of all other sciences or departments of human knowledge, from the earliest medical records to the close of the nineteenth century. Such history has shown that prior to the actual study of human anatomy, and the development of analytical chemistry during the fourteenth and fifteenth centuries, A. D., all medical practice was essentially empirical, though often modified in application by the prevailing systems of so-called philosophy. And as nearly all the more eminent philosophers of the earlier centuries were also physicians, each attracting to himself or his doctrines more or less numerous followers or disciples who regarded him as the founder of a system or school of medicine which they designated by his name. Thus before the Christian era we had prominently the medical schools of Hippocrates; Plato; Aristotle; Asclepiades, and Soranus; and during the ten subsequent centuries, the schools of Galen; Cælius Aurelianus; Ætius; Alexander of Tralles; Paulus of Ægina; and in Arabia, the school of Rhazes, Avicenna and Geber. Each of these schools consisted of the observed facts, opinions and theoretical views of the individual teacher or writer and his followers. All of them embraced some items of value, and all of them were more or less influenced by the universal belief in the elementary nature of fire, air, earth, and water. and in the four humors and their concoctions.

Pre-eminent among all these early leaders in medicine

were Hippocrates and Galen, whose wide fields for observation, close adherence to observed facts and the results of experience in the treatment of diseases, gave to their writings unquestioned authority both as text-books and guides in practice for more than one thousand years.

The development of human anatomy by Vesalius and of analytical chemistry by the alchemists during the fourteenth and fifteenth centuries, aided by the invention of the art of printing, struck the first effectual blow against the reign of personal authority, and laid the chief corner stone for the whole fabric of true medical science and practice, as briefly indicated in the preceding chapters of this volume. Once in possession of a correct knowledge of all parts of the human body constituting descriptive anatomy, the study of the function of each part necessarily followed, thereby developing the department of Physiology.

As all diseases are departures from physiological conditions of function or structure, or of both, the study of such conditions soon added to the expanding field of medical knowledge the departments of Pathology, Pathological Anatomy and Physical Diagnosis. During the same time the application of analytical chemical processes to the study of air, earth, water and inorganic bodies generally, rapidly revealed their actual composition, the laws governing their combination, and the physical forces by which they were influenced, as affinity, attraction, heat, light and electricity. Extension of the same analytical processes to the study of organic bodies soon revealed the composition of living bodies, both vegetable and animal, by which has been developed the extensive departments of physics and biology. And as the progress of physics brought to our aid the microscope, by the persistent and skillful use of which every department of medicine has been enriched or renovated and the important fields of minute anatomy and bacteriology have been added, the co-incident discovery of the art of printing not only furnished the needed facilities for recording and preserving the facts and results of investigations of every kind, but by the publication of papers and periodicals furnished the first efficient medium for free discussion, and the

rapid diffusion of knowledge in all the countries of Christendom.

By the co-operation of these several influences, during the sixteenth, seventeenth and eighteenth centuries, not only was medicine transformed from an aggregation of fanciful closet speculations and the facts of individual experience, but it, together with all the departments of natural science were developed by strictly scientific investigations and logical deductions from carefully observed facts. Consequently, during the nineteenth century it became impossible longer to build up or maintain any purely theoretical or exclusive individual schools of medicine, founded on some one supposed universal law of disease or equally universal law of cure, within the ranks of educated medical men. Many such attempts have been made. But the strictly scientific investigations, clinical experience, and free discussions to which they were subjected soon caused them to be either abandoned or compelled to withdraw from the legitimate channels of medical discussion, and appeal to the non-professional public through the ordinary newspapers or to periodicals devoted exclusively to the advocacy of their special dogmas. By such means the idea of the existence of several distinct and rival Schools of Medicine has been perpetuated in the popular mind, and are recognized in the laws of many of our States until the present time.

The most noted of these is the Homeopathic school, founded by Hahnemann during the last quarter of the eighteenth century. Samuel Christian Friedrich Hahnemann, of Germany, was born in 1755, A. D., and died in 1843. He commenced the study of medicine in 1775 at Leipsic and after two years changed to Vienna, where he was obliged to spend a part of his time in earning the money necessary for prosecuting his studies. He graduated at Erlangen in 1779. During the next twenty-five years he resided and practised his profession in no less than twelve different cities of Germany.

In 1792 he was Superintendent of the Asylum for the Insane at Georgenthal, in Thuringia, and in 1794 he was in Pyrmont and Brunswick. While at Leipsic he devoted con-

siderable attention to chemistry and materia medica, and it is said was requested to test the effects of cinchona upon himself by Cullen. While taking moderate doses of cinchona for this purpose he claimed that it caused chills and fever closely resembling the symptoms of intermittent fever for which it had come to be regarded as the chief remedy. This directly suggested the theory that the most appropriate and effectual remedy for any disease was the one that when given in health produced symptoms most resembling those of the disease it was capable of curing. Hence his maxim "Similia Similibus Curantur", which is said to have been vaguely hinted at by Hippocrates and more plainly stated by Paracelsus. He soon began to apply his theory in his practice by administering moderate doses of several important drugs either to himself or other persons in good health, and recording minutely all the sensations or symptoms that followed the taking of each dose not only during the succeeding few hours, but for several days. With the aid of his friends, a Materia Medica was soon constructed consisting of the proved symptoms of each drug. In like manner diseases were studied and their symptoms only recorded in detail. Consequently all the physician had to do when called to a patient was to note his symptoms carefully and then select as the proper remedy the drug with symptoms most closely resembling those presented by the patient.

Questions pertaining to ætiology, pathology and pathological anatomy received little or no attention; the system being founded exclusively on symptomatology. Any one of its most remarkable features was the number of symptoms attributed to a single dose of each drug. For example, to chloride of sodium were attributed 1349 symptoms; to lycopodium, 1608; and to some of the more important drugs the number of symptoms enumerated was over 4,000.

In 1796 Hahnemann published an "Essay on a New Principle for Ascertaining the Curative Properties of Drugs" in which he not only advocated his law of similia similibus as the universal law of cure, but also the doctrine that by certain dilutions and attenuations the curative power

of drugs could be increased to an unlimited degree. By these processes was evolved his second universal law, i. e., the greater the attenuation of a drug, or the smaller the dose, the greater the curative power.

He also attached much importance to the method and degree of attenuating or diluting medicines for use. If the crude drug was in liquid form, one minim was to be put with one hundred minims of water or alcohol and given a certain number of shakes, which constituted the first dilution. One minim of this was to be mixed with one hundred minims of water for the second dilution. The same process was repeated until the tenth, twentieth or even thirtieth dilution was reached. It was claimed that each dilution imparted additional potency or curative power; and the thirtieth, which would contain only an infinitesimal part of a minim of the drug was regarded by Hahnemann as the most important for use in the treatment of acute diseases. If the crude drug was in the form of powder the same principle governed in its preparation for use. One grain was triturated with one hundred grains of sugar of milk for the first attenuation. One grain of this was triturated with another one hundred grains of sugar of milk, and so on to the tenth, twentieth or thirtieth attenuation and then generally rolled into small pellets or pills.

The publication of this law of increased potency in direct proportion to the degree of attenuation, or smallness of the dose, was received with so much skepticism and derision by the profession, that in 1802 he abandoned the regular medical channels of communication, and began to address his views to the public, both by public lectures and through the secular press. In 1805 while at Torgau he first styled his own system founded on the laws of similars and infinitesimal doses as Homeopathy, and all other medical practice as Allopathy. His leading work called "The Organon" was published in 1810. The next year he settled in Leipsic, where he lectured and practised and succeeded in gaining some medical converts, among whom were Gross, Hornburg, and Wislicanus. As both Hahnemann and his followers prepared their own medicines, which brought them in conflict

with the apothecaries, the authorities of Saxony were induced to forbid medical practitioners to prepare or dispense their own medicines. This caused him to change his residence to Köthen in 1821, where he became physician-in-ordinary to the Lord of Anhalt-Köthen and where his wife died in 1825. While at Köthen he and his followers began to organize Homeopathic societies, journals and hospitals; and in 1828 he published his work on Chronic Diseases, in which he contended that all such diseases were caused either by syphilis, sycosis or psora (itch).

In 1830 he married a young French woman who was possessed of an ample fortune and by whom he was soon persuaded to settle in Paris, where he continued his practice and attracted much public attention until his death in 1843. His fundamental doctrine concerning the nature of diseases was that they were "spirit-like, or dynamic aberrations of our spirit life manifested in sensations and actions." He admitted no morbid anatomy, no material causes of disease, and made no classification, except into acute and chronic. He admitted of but one law of cure, i. e., similia similibus, and but one mode of creating specific remedies, i. e., by the potentizing effects of repeated attenuations or dilutions.

His earlier disciples, Hermann, Gross and Lutz soon carried his law of similars to the extreme of actual Isopathy, by attempting to cure variola by administering variolus pus; diarrhœa by giving fæcal matter; tapeworm by eating joints or segments of the worm. This, however, was too disgusting to attract many followers. On the other hand, the later and better educated followers of Hahnemann, as early as 1850, began to recognize and incorporate into their teaching the results of pathological investigations, and to use in their practice larger doses of medicine. They admitted that some medicines acted on particular organs or tissues. Such was the case particularly with Griessellich, Arnold and Herschel.

In 1871 Heinigke endeavored to explain the potentizing of drugs by claiming that by the numerous dilutions or triturations the atoms of the drugs were freed from their chemical affinities, and only by such molecular freedom did they acquire specific curative power in the treatment of diseases.

Lutze, in his memorial address on Hahnemann in 1872, said: "The poisonous properties are removed from a drug through its dilutions, while its special peculiarities, so to speak, its soul, remained and by rubbing and shaking becomes vivified and strengthened by human magnetism."

The system of practice of Hahnemann was introduced into England by a Dr. Quin, in 1827, and gained some attention and patrons chiefly in the larger cities. One hospital containing 100 beds was established in London, in connection with which was organized the only homeopathic college in Great Britain.

The system was introduced into the United States by Dr. Hans B. Gram, a native of Boston, but who had been educated in Copenhagen and returned to this country in 1825, settling in the City of New York where he practised until his death in 1840.

The novelty of the so-called law of cure by similars, coupled with the mystery of potentizing drugs by dilution until they became tasteless and infinitesimal in dose, and diseases claimed to be only "dynamic aberrations of our spirit life", were well calculated to attract the attention of a few medical men and a large class of non-professional reading persons of both sexes who, so far as relates to medicine, are prone to place the most implicit faith in whatever of theory or practice is most mysterious or incomprehensible. Consequently the doctrines of Hahnemann were embraced by a sufficient number of medical men, chiefly in the larger cities of this country, to enable them to commence the publication, in 1834, of a journal called the "American Journal of Homeopathia", edited by Drs. J. F. Gray and A. Gerald Hull; and in 1844 they organized the "American Institute of Homeopathy" with between forty and fifty members.

One of the most active propagators of the homeopathic doctrines in this country was Constantin Hering, a native of Saxony, who came to the United States in 1834. He was the author of the work called the "Domestic Physician", published in 1858, which in connection with neatly filled cases of ready prepared attenuated medicines in the form of sugar

"pellets", greatly facilitated the introduction of the system into family use.

During the three decades following 1840 the converts to the system increased with considerable rapidity. Homeopathic societies were organized in a majority of the States. Homeopathic hospitals, colleges and journals were established in several of the large cities, and the system reached the climax of its popularity before the end of the third quarter of the nineteenth century, when it claimed the existence of 12 or 13 colleges from which about 430 persons were graduated annually, while the regular medical colleges numbered 124 and the annual number of graduates more than 3,000. Even this very limited degree of development from an hundred years of strictly sectarian cultivation has been attained only by the practical abandonment of every distinctive principle or doctrine advocated by Hahnemann, except the names he invented, i. e., Homeopathy and Allopathy. By following the example of Griesselich, Arnold and Herschel, and incorporating into their works the results of the regular investigations in pathology, pathological anatomy, ætiology, bacteriology and diagnosis; and into their schools the same text-books on two thirds of the branches taught as are used in all the regular medical schools; and in their practice the use of drugs in any doses required to produce the desired effect, they have preserved before the public the form and machinery of a medical sect called Homeopathic, while the fanciful dogmas of its founder have practically disappeared. And there are abundant evidences indicating that before the middle of the twentieth century even the name will have become as obsolete as the fanciful dogmas it was invented to designate. The Medical Times, formerly an influential homeopathic journal, recently made the following statement: "The American Homeopathist has changed its name to the American Physician; and it is a most sensible thing to do. The use of the terms homeopathic and allopathic is obsolete, and it would be better if they were never used."

THOMPSONIANISM: While homeopathy, or the system of Hahnemann, was having its birth and development in Ger-

many an equally fanciful, though far more dangerous, system of medicine was conceived and promulgated in this country by Benjamin Thompson, who was born in New Hampshire in 1769 and died in Boston in 1843. With a very limited degree of education in either literature, science or medicine he promulgated through the secular press a system of medicine and commenced prescribing for the sick in 1792. His system and practice were based on the following declarations: "Heat is life. Cold is death. Vegetables grow upward and sustain life. Minerals sink in the earth and therefore tend to produce death." Consequently he selected all his remedies from the vegetable kingdom with the exception of hot water or steam.

As his knowledge of botany was very limited his list of remedies was equally brief, consisting of lobelia inflata, steam, cayenne pepper and a strong tincture of pungent aromatic herbs called "No. 6", all chosen for their supposed influence in sustaining the temperature of the living body, and increasing the evacuation of all morbid or disease-producing agents through the stomach by emesis, and the skin by diaphoresis. He discarded the use of all mineral medicines, and was especially severe in denouncing the preparations of mercury, and all physicians who prescribed them. He attributed all cases of necrosis, chronic rheumatism, periostitis, and neuralgia to the poisonous effects of calomel and other minerals previously given by regular physicians. His usual mode of treating all acute diseases was to produce free vomiting by full doses of lobelia, followed by steam or vapor baths, and then frequent doses of cayenne pepper or of "Number 6". Even many old chronic diseases were treated by the same active routine for the purpose of expelling from the system mineral poisons alleged to have been taken years previously.

Thompson prepared and had printed a small book stating his fundamental doctrines and method of treating diseases and in 1813 obtained a patent on his system, and began to sell to other parties the right to practise it, with a copy of his book, for $20. A travelling agent for the Ohio Valley and Southern States is reported to have sold no less

than 4,000 copies between 1827-30, thereby realizing $80,000. The simplicity of Thompson's theories and the visible activity of his remedies, coupled with the constant denunciation of the regular profession for using poisonous minerals, caused them to be readily adopted by the less educated and working classes in all parts of the country. A very large majority of those who chose to practise the Thompsonian system were devoid of any regular medical education or legal license to practise, and were very generally styled "steam and herb doctors." Their ignorant and reckless administration of repeated emetic doses of lobelia and protracted vapor baths produced fatal exhaustion in many cases, even in the care of Thompson himself, by which he became involved in several suits for malpractice and lost much of his earlier influence, before his death in 1843.

As the personal influence of Thompson passed its zenith, Dr. Alva Curtis, of Ohio, became a leader with more knowledge of medical botany and more caution in the use of lobelia and steam, and introduced among his followers a larger number of vegetable remedies, but maintained all the bitterness of the original Thompsonians against the use of minerals.

He designated his system as Botanico-Medical, and in 1837 commenced the publication of a journal advocating it in Columbus; and in 1841 he obtained a charter for a Botanico-Medical college to be established in Cincinnati. Later he professed to discard the use of all poisons as medicines whether mineral or vegetable, claiming that all remedies to exert a curative influence must act in harmony with physiological processes, and therefore changed the name of his system to "Physio-Medical" instead of Botanico-Medical.

He succeeded in attracting some followers until 1855 when his journal, called the Physio-Medical Recorder, passed under the control of Dr. W. H. Cook, who continued its publication until 1885 when both it and the college in Cincinnati were discontinued. In the meantime a Physio-Medical college had been organized in Indianapolis and another in Chicago, from which about twenty students were graduated annually from 1881 to 1890. Since the latter date the num-

ber of students in attendance has seldom equalled the number of their professors.

While Dr. Curtis was leading one part of the original followers of Thompsonianism in the direction of the Physio-Medical system, Dr. Wooster Beach was leading the remainder in the direction of simple Eclecticism by endeavoring to establish a "Reformed Medical College" in New York. Failing in that, another college was organized at Worthington, Ohio, and attracted a few students annually for ten years when it ceased to exist. In 1845 a much more successful institution was established in Cincinnati, Ohio, called the "Eclectic Medical Institute." Dr. John M. Scudder became professor of Practice and Pathology; and Drs. J. B. Jones, William Sherwood and John King were also members of the faculty. Dr. Scudder added to his eclectic principle of selecting the good from all other systems of practice that of "specific medication." Drs. Jones and Sherwood published a work entitled "American Eclectic Practice of Medicine" in 1857; and Dr. King a work on "Chronic Diseases" in 1867, and an "American Dispensatory" in 1874.

The Eclectic Institute in Cincinnati thus became the leading college of Eclecticism in America, and during the first twenty years of its existence graduated not less than 1800 students.

Other Eclectic schools and journals were established in many of the larger cities, and Eclectic Medical Societies were organized in a majority of the states prior to 1880. Since that date, more than half of the schools and journals originally established have been discontinued for lack of support, and the sect appears to be in the same state of decline as the Physio-Medicists. Yet during the most active and aggressive stage in the progress of both Eclecticism and Homeopathy, which was during the second quarter of the nineteenth century, they were enabled to induce the legislatures of several states to repeal the legal restrictions that had been enacted against unlicensed practitioners. And chiefly by the direct political influence of their state society organizations they have succeeded in causing their legal recognition by representation on nearly all the State Boards of Health and

Examination in the several states, thus presenting the absurd position of legally recognizing several distinct and opposing medical theories, and thereby perpetuating the erroneous popular idea of competing schools of medicine.

The true object of establishing State Boards of Examiners is, or should be, to see that all persons licensed to practise medicine were possessed of sufficient knowledge of all the branches of medical science and theory to make them safe practitioners of the healing art. Neither the Homeopathic, Thompsonian, Botanico-Medical, nor modern Eclectic, so-called, systems or schools of medicine have received legal recognition in any of the countries of Europe.

Now, with the close of the nineteenth century, the most popular and progressive medical sectarians are the "Christian Scientists", the "faith" or "Divine Healers", and the "Osteopaths", all of whom discard entirely the use of medicine. The two first rely entirely on mental influences for the relief of human suffering, and the third add a vigorous system of massage ostensibly for correcting displacements and imperfect adjustments of the bones in the living body, to which they attribute all forms of disease.

The Christian Scientists, who are the most numerous and most active in winning followers on both sides of the Atlantic, declare all diseases and sufferings to be only morbid mental conditions, to be removed solely by persuading themselves that they are well, aided by the mental suggestions and will power of others. The founder of the sect, Mrs. Baker Eddy, of Massachusetts, claims to have discovered the true method of curing diseases by her own spontaneous recovery from the effects of an internal injury caused by an accident. She first called her system "Divine Metaphysical Healing." In 1866 she changed the name to "Christian Science"; and in 1876 organized in Boston the first Christian Science Society. Since that time her followers have increased with considerable rapidity, and Christian Science societies, churches and schools have been formed in many parts of this country, and to some extent in Europe. The system as taught and published by Mrs. Eddy is a blending or union of her ideas of religion and medicine as complete as was the religio-medical

doctrines of the Æsclepiadæ of ancient Greece and Rome. It claims that all suffering or disease is mental, and to be cured only by mental influences. The use of drugs or material medicines of every kind is persistently refused. The patient or sufferer is given the most positive assurances that if he will persistently endeavor to believe that he has no bodily or physical disease, and will devote a specified time each day to such efforts, and at the same hours have the aid of the will power and suggestion of one or more of those who have acquired confidence and skill in guiding the mental forces, he will find relief. Every intelligent reader will perceive that this "Christian Science" is simply an effort to relieve all suffering by hypnotism and mental suggestion as recognized by regular physicians and psychologists, with enough reference to Divine aid to justify calling it Christian.

From the preceding brief history of the more noted special or exclusive schools of Medicine existing during the nineteenth century, it will be seen that the founders of each voluntarily withdrew with their followers from the ordinary medical periodicals and channels for professional discussion, and proclaimed their doctrines through either periodicals exclusively for that purpose or through the secular press. They all claimed to have discovered some one universal law of morbid action or disease, and one general therapeutic law of cure, on which their respective systems were based, with little or no reference to progressive pathological changes or the material causes of disease. Consequently they were incapable of improvement by the application of new discoveries in either physics or biology; and equally incapable of furnishing a basis for preventive medicine or public sanitation, without ignoring or nullifying one or more of their fundamental laws, and at every step approximating the scientific field of legitimate medicine, until having only the sectarian name left for a proprietary trademark.

Such has been the fate of all attempts to establish sectarian schools of medicine or special medical systems, founded on some one or more so-called universal laws, either of ætiology, pathology, or therapeutics, through all the centuries

past, and such will be their fate to the end of time, for the simple reason that there are no such universal laws governing the development and progress of disease, or of its cure. Man, as a living being, is subject to all the influences, mental and physical, that surround him in the air, the water, the earth, the ingesta of food and drink, and the social conditions he encounters. And his diseases are as diverse in their origin, progress and results as are the ever varying conditions that surround him. Consequently the several departments of legitimate medicine are composed of such facts and materials, gathered from every other field of human knowledge, as relate to the causes, tendencies and results of diseases, and their remedies. Each of those departments, therefore, must advance with every new discovery or advancement or implement of more accurate research, in the general departments of science to which they relate. Such are the diverse tendencies and results of legitimate medicine, and of medicine founded on exclusive dogmas or so-called universal laws. The one is ever progressive, the other like the good ship stranded upon the rocks.

CHAPTER XIV.

THE ORIGIN AND PROGRESS OF MEDICAL ETHICS TO THE END OF THE NINETEENTH CENTURY.

Medical Ethics is that branch of moral philosophy which treats of the duties, responsibilities and rights of members of the medical profession in relation to the nature of their calling, their relation to each other and their relations to the whole community. General ethics or moral philosophy has occupied the attention of the most learned men in all ages past, and has ever been closely connected with the co-incident systems of religion.

The earliest attempts to formulate definite rules of conduct for the guidance of physicians, of which we have any reliable account, were made in Greece when both medical teaching and practice were chiefly connected with the Asclepiadæ and temples for worship, and had for their chief objects the perpetuation of the doctrines of each school by the pupils, their support of each other, and the prevention of improper persons from entering their ranks.

Pythagoras, about 550 B. C., endeavored to organize his followers in a club or sect with definite rules for the maintenance of both high character and judicious modes of living. The teaching of Socrates was still more ethical, but the earliest attempt to formulate a medical code that has been preserved in writing is known as the Hippocratic Oath, and is as follows: "I swear by Apollo, the physician; by Æsculapius, by Hygeia, by Panacea, and all of the Gods and Goddesses, that according to my ability and judgment, I will keep this oath and stipulation, to reckon him who teaches me this art equally dear to me as my parents; to share my substance with him and relieve his necessities if required; to look upon his offspring on the same footing as my own brothers, and to teach them this art if they shall wish to learn it, without fee or stipulation; and that by precept, lecture and every other mode of instruction, I will impart a knowledge of this art to my own sons, to those of my teach-

ers, and to disciples bound by a stipulation and oath according to the law of medicine, but to no others. I will follow that system of regimen, which, according to my ability and judgment, I consider for the benefit of my patients; and abstain from whatever is deleterious and mischievous; I will give no deadly medicine to any one, if asked, nor suggest any such counsel; and in like manner I will not give a woman a pessary to produce an abortion. With purity and with holiness I will pass my life and practise my art. I will not cut persons laboring under the stone, but will leave this to be done by men who are practitioners of this work. Into whatever houses I enter, I will go into them for the benefit of the sick, and will abstain from every voluntary act of mischief and corruption; and further, from the seduction of females and males, of freemen and slaves. Whatever in connection with my professional practice, or not in connection with it, I see or hear, I will not divulge as reckoning that all such things should be kept secret. While I continue to keep this oath inviolate, may it be granted to me to enjoy life and the practice of my art, respected by all men at all times. But should I trespass and violate this oath, may the reverse be my lot."

This oath constituted substantially the ethical code of all the Asclepiadæ until their suppression by the spread of the Christian religion. Even then the same principles were adopted in the monasteries, hospitals, and medical schools that succeeded under the first ten centuries of the Christian dispensation. An attentive reading of the text as translated from its original Greek shows that its author had four leading objects in view.

First, that every physician should feel a profound respect and gratitude for his medical teachers, and be ready at all times to extend to them the same aid as to his own kindred.

Second, that he should teach his own sons and his teacher's sons, if they desired it, the same art of medicine fully and free of charge, and to no others except such disciples as bound themselves by stipulation and oath to observe the law

of medicine; thereby fostering a distinct hereditary tendency in the perpetuation of the profession.

Third, that the paramount objects of all medical practice are to benefit the sick, to relieve human suffering, and to prolong human life; and not for mere pecuniary gain.

Fourth, that a life of virtue, temperance and integrity on the part of the physician is essential both for his own success and for the safety of his patients; thereby indicating that personal example is more influential than precept.

The foregoing ethical principles and objects were admirably illustrated both in the writing and the conduct of Hippocrates. And their beneficial influence can be easily traced through even the darkest periods of European history, though their practical application was often interfered with by the almost constant wars, and the frequent attempts to enforce ecclesiastical authority.

It was not until the end of the eigtheenth century that the Hippocratic code was more fully discussed, revised and extended by Sir Thomas Percival, an eminent English physician, born in Warrington, England, September 29th, 1740. He was educated at the Warrington Academy and the University of Edinburgh, completed his medical studies and received the degree of M. D. at Leyden in 1765. Two years later he commenced the practice of his profession in Manchester, and in 1781 was one of the chief founders of the Manchester literary and philosophical society. He made several valuable contributions to the "Philosophical Transactions" of London and of Manchester.

Later in life, he wrote much on moral and literary topics and enjoyed a high reputation. In 1803 he published his work entitled "Medical Ethics, or a Code of Institutes and Precepts adapted to the Professional Conduct of Physicians and Surgeons." He died in Manchester, August 30th, 1804. After his death all his important works were collected and published by his son in four volumes, octavo, in London in 1807. His work on Medical Ethics embraced a full and very interesting discussion of the nature of the physician's calling; the duties of the physician to his patients and the obligations of the patient to his physician; the duties of physicians to each

other and to the profession at large; and the duties of the profession to the public and the obligations of the public to the profession. It was received with so much favor that it speedily became the standard authority on medical ethics by the profession of Great Britain and her colonies, and has continued such until the present time.

Dr. John Gregory, when at the head of the medical faculty of the University of Edinburgh, in a series of lectures, discussed very fully the duties of the physician. He was followed on the same subject by Dr. Benjamin Rush, of Philadelphia, and as medical societies multiplied during the first half of the nineteenth century, many of them adopted the leading sentiments of Percival's code either in their by-laws or in brief codes of their own compilation. One of the most formal of the latter class was unanimously adopted by the New York State Medical Society in 1823, as reported by a committee of which Dr. J. R. Manley was chairman. It was called a "System of Medical Ethics", and was considered in five divisions, namely: Ist. Personal Character of Physicians. 2nd. Quackery. 3rd. Consultations. 4th. Specifications of Medical Police in Practice. 5th. Forensic Medical Police. At the national Convention of delegates from the local and state medical societies, medical colleges and hospitals, in the United States, held in New York in May, 1846, the following resolution was adopted:

"Resolved, That it is expedient that the medical profession of the United States should be governed by the same code of medical ethics, and that a committee of seven be appointed to report a code for that purpose, at a meeting to be held at Philadelphia on the first Wednesday of May, 1847." The committee appointed for that purpose consisted of Drs. John Bell, Isaac Hays, and G. Emerson, of Philadelphia; W. W. Morris, of Dover, in Del.; T. C. Dunn, Newport, R. I.; A. Clark, of New York; and R. D. Arnold, of Savannah, Ga. This committee, at the convention in Philadelphia, 1847, made an interesting report, accompanied by a more complete code of medical ethics than any previously devised. It was adopted by unanimous vote of the convention; and as that body at the same meeting resolved

itself into the permanent American Medical Association, it became the code of that organization, and was fully recognized in its constitution and by-laws. Its principles and much of its language were copied from the work of Dr. Percival, though some important paragraphs are nearly in the words of Drs. Gregory and Rush; all of which was fully acknowledged by the committee in a note appended to their report.

The leading purpose prompting the formulation of the code was to obtain a common and just standard of professional rights and duties, to guide the medical men in all the states of the American Union. And as the American Medical Association organized at that time was to be a strictly representative body composed of delegates from the several State, District and County Medical Societies in all the states, it adopted as one of its by-laws the following in 1865: "No State or Local Medical Society, or other organized institution, shall be entitled to representation in this Association that has not adopted its Code of Ethics; or that has intentionally violated or disregarded any article or clause of the same."

In accordance with this by-law, nearly all the regular State and Local Medical Societies have adopted the same Code of Ethics, and it remains in full force at the present time; and is in the following language:

ART. I.—Duties of physicians to their patients.

Section 1. A physician should not only be ever ready to obey the calls of the sick, but his mind ought also to be imbued with the greatness of his mission, and the responsibility he habitually incurs in its discharge. These obligations are the more deep and enduring, because there is no tribunal other than his own conscience to adjudge penalties for carelessness or neglect. Physicians should, therefore, minister to the sick with due impressions of the importance of their office; reflecting that the ease, the health, and the lives of those committed to their charge, depend on their skill, attention, and fidelity. They should study, also, in their deportment, so to unite tenderness with firmness, and conde-

scension with authority, as to inspire the minds of their patients with gratitude, respect, and confidence.

Section 2. Every case committed to the charge of a physician should be treated with attention, steadiness and humanity. Reasonable indulgence should be granted to the mental imbecility and caprices of the sick. Secrecy and delicacy, when required by peculiar circumstances, should be strictly observed; and the familiar and confidential intercourse to which physicians are admitted in their professional visits, should be used with discretion, and with the most scrupulous regard to fidelity and honor. The obligation of secrecy extends beyond the period of professional services; none of the privacies of personal and domestic life, no infirmity of disposition or flaw of character observed during professional attendance should ever be divulged by the physician except when he is imperatively required to do so. The force and necessity of this obligation are indeed so great, that professional men have, under certain circumstances, been protected in their observance of secrecy by courts of justice.

Section 3. Frequent visits to the sick are in general requisite, since they enable the physician to arrive at a more perfect knowledge of the disease—to meet promptly every change which may occur, and also tend to preserve the confidence of the patient. But unnecessary visits are to be avoided, as they give useless anxiety to the patient, tend to diminish the authority of the physician, and render him liable to be suspected of interested motives.

Section 4. A physician should not be forward to make gloomy prognostications, because they savor of empiricism, by magnifying the importance of his services in the treatment or cure of the disease. But he should not fail, on proper occasions, to give to the friends of the patient timely notice of danger when it really occurs; and even to the patient himself, if absolutely necessary. This office, however, is so peculiarly alarming when executed by him, that it ought to be declined whenever it can be assigned to any other person of sufficient judgment and delicacy. For the physician should be the minister of hope and comfort to the sick; that, by such

cordials to the drooping spirit, he may soothe the bed of death, revive expiring life, and counteract the depressing influence of those maladies which often disturb the tranquility of the most resigned in their last moments. The life of a sick person can be shortened not only by the acts, but also by the words or the manner of a physician. It is, therefore, a sacred duty to guard himself carefully in this respect, and to avoid all things which have a tendency to discourage the patient and to depress his spirits.

Section 5. A physician ought not to abandon a patient because the case is deemed incurable; for his attendance may continue to be highly useful to the patient, and comforting to the relatives around him, even in the last period of a fatal malady, by alleviating pain and other symptoms, and by soothing mental anguish. To decline attendance, under such circumstances, would be sacrificing to fanciful delicacy and mistaken liberality, that moral duty which is independent of, and far superior to, all pecuniary consideration.

Section 6. Consultations should be promoted in difficult or protracted cases, as they give rise to confidence, energy, and more enlarged views in practice.

Section 7. The opportunity which a physician not unfrequently enjoys of promoting and strengthening the good resolutions of his patients, suffering under the consequences of vicious conduct, ought never to be neglected. His counsels, or even remonstrances, will give satisfaction, not offense, if they be proffered with politeness, and evince a genuine love of virtue, accompanied by a sincere interest in the welfare of the person to whom they are addressed.

Art. II.—Obligations of patients to their physicians.

Section 1. The members of the medical profession, upon whom is enjoined the performance of so many important and arduous duties toward the community, and who are required to make so many sacrifices of comfort, ease, and health, for the welfare of those who avail themselves of their services, certainly have a right to expect and require, that their patients should entertain a just sense of the duties which they owe to their medical attendants.

Section 2. The first duty of a patient is to select as his

medical adviser one who has received a regular professional education. In no trade or occupation do mankind rely on the skill of an untaught artist; and in medicine, confessedly the most difficult and intricate of the sciences, the world ought not to suppose that knowledge is intuitive.

Section 3. Patients should prefer a physician whose habits of life are regular, and who is not devoted to company, pleasure, or to any pursuit incompatible with his professional obligations. A patient should, also, confide the care of himself and family, as much as possible, to one physician; for a medical man who has become acquainted with the peculiarities of constitution, habits, and predispositions of those he attends, is more likely to be successful in his treatment than one who does not possess that knowledge.

A patient who has thus selected his physician should always apply for advice in what may appear to him trivial cases, for the most fatal results often supervene on the slightest accidents. It is of still more importance that he should apply for assistance in the forming stage of violent diseases; it is to a neglect of this precept that medicine owes much of the uncertainty and imperfection with which it has been reproached.

Section 4. Patients should faithfully and unreservedly communicate to their physician the supposed cause of their disease. This is the more important, as many diseases of a mental origin simulate those depending on external causes, and yet are only to be cured by ministering to the mind diseased. A patient should never be afraid of thus making his physician his friend and adviser; he should always bear in mind that a medical man is under the strongest obligations of secrecy. Even the female sex should never allow feelings of shame or delicacy to prevent their disclosing the seat, symptoms, and causes of complaints peculiar to them. However commendable a modest reserve may be in the common occurrences of life, its strict observance in medicine is often attended with the most serious consequences, and a patient may sink under a painful and loathsome disease, which might have been readily prevented had timely intimation been given to the physician.

Section 5. A patient should never weary his physician with a tedious detail of events or matters not appertaining to his disease. Even as relates to his actual symptoms, he will convey much more real information by giving clear answers to interrogatories, than by the most minute account of his own framing. Neither should he obtrude upon his physician the details of his business nor the history of his family concerns.

Section 6. The obedience of a patient to the prescriptions of his physician should be prompt and implicit. He should never permit his own crude opinions as to their fitness to influence his attention to them. A failure in one particular may render an otherwise judicious treatment dangerous, and even fatal. This remark is equally applicable to diet, drink, and exercise. As patients become convalescent they are very apt to suppose that the rules prescribed for them may be disregarded, and the consequence, but too often, is a relapse. Patients should never allow themselves to be persuaded to take any medicine whatever, that may be recommended to them by the self-constituted doctors and doctresses who are so frequently met with, and who pretend to possess infallible remedies for the cure of every disease. However simple some of their prescriptions may appear to be, it often happens that they are productive of much mischief, and in all cases they are injurious, by contravening the plan of treatment adopted by the physician.

Section 7. A patient should, if possible, avoid even the friendly visits of a physician who is not attending him—and when he does receive them, he should never converse on the subject of his disease, as an observation may be made, without any intention of interference, which may destroy his confidence in the course he is pursuing, and induce him to neglect the directions prescribed to him. A patient should never send for a consulting physician without the express consent of his own medical attendant. It is of great importance that physicians should act in concert; for, although their modes of treatment may be attended with equal success when applied singly, yet conjointly they are very likely to be productive of disastrous results.

Section 8. When a patient wishes to dismiss his physician, justice and common courtesy require that he should declare his reasons for so doing.

Section 9. Patients should always, when practicable, send for their physician in the morning, before his usual hour of going out; for, by being early aware of the visits he has to pay during the day, the physician is able to apportion his time in such a manner as to prevent an interference of engagements. Patients should also avoid calling on their medical adviser unnecessarily during the hours devoted to meals or sleep. They should always be in readiness to receive the visits of their physician, as the detention of a few minutes is often of serious inconvenience to him.

Section 10. A patient should, after his recovery, entertain a just and endearing sense of the value of the services rendered him by his physician; for these are of such a character, that no mere pecuniary acknowledgment can repay or cancel them.

OF THE DUTIES OF PHYSICIANS TO EACH OTHER, AND TO THE PROFESSION AT LARGE.

ART. I.—Duties for the support of professional character.

Section 1. Every individual, on entering the profession, as he becomes thereby entitled to all its privileges and immunities, incurs an obligation to exert his best abilities to maintain its dignity and honor, to exalt its standing, and to extend the bounds of its usefulness. He should, therefore, observe strictly such laws as are instituted for the government of its members; should avoid all contumelious and sarcastic remarks relative to the faculty as a body; and while, by unwearied diligence, he resorts to every honorable means of enriching the science, he should entertain a due respect for his seniors, who have, by their labors, brought it to the elevated condition in which he finds it.

Section 2. It is not in accord with the interests of the public or the honor of the profession that any physician or medical teacher should examine or sign diplomas or certificates of proficiency for, or otherwise be specially concerned with, the graduation of persons whom they have good rea-

son to believe intend to support and practice any exclusive and irregular system of medicine.

Section 3. There is no profession from the members of which greater purity of character and a higher standard of moral excellence are required, than the medical; and to attain such eminence is a duty every physician owes alike to his profession and to his patients. It is due to the latter, as without it he cannot command their respect and confidence, and to both, because no scientific attainments can compensate for the want of correct moral principles. It is also incumbent upon the faculty to be temperate in all things, for the practice of physic requires the unremitting exercise of a clear and vigorous understanding; and, on emergencies, for which no professional man should be unprepared, a steady hand, an acute eye, and an unclouded head may be essential to the well-being, and even to the life, of a fellow-creature.

Section 4. It is derogatory to the dignity of the profession to resort to public advertisements, or private cards, or handbills, inviting the attention of individuals affected with particular diseases—publicly offering advice and medicine to the poor gratis, or promising radical cures; or to publish cases and operations in the daily prints, or suffer such publications to be made; to invite laymen to be present at operations, to boast of cures and remedies, to adduce certificates of skill and success, or to perform any other similar acts. These are the ordinary practices of empirics and are highly reprehensible in a regular physician.

Section 5. Equally derogatory to professional character is it for a physician to hold a patent for any surgical instrument or medicine; or to dispense a secret nostrum, whether it be the composition or exclusive property of himself or of others. For, if such nostrum be of real efficacy, any concealment regarding it is inconsistent with beneficence and professional liberality; and if mystery alone give it value and importance, such craft implies either disgraceful ignorance or fraudulent avarice. It is also reprehensible for physicians to give certificates attesting the efficacy of patent or secret medicines, or in any way to promote the use of them.

ART. II.—Professional services of physicians to each other.

Section 1. All practitioners of medicine, their wives, and their children while under the paternal care, are entitled to the gratuitous services of any one or more of the faculty residing near them, whose assistance may be desired. A physician afflicted with disease is usually an incompetent judge of his own case; and the natural anxiety and solicitude which he experiences at the sickness of a wife, a child, or any one who, by ties of consanguinity, is rendered peculiarly dear to him, tend to obscure his judgment, and produce timidity and irresolution in his practice. Under such circumstances, medical men are peculiarly dependent upon each other, and kind offices and professional aid should always be cheerfully and gratuitously afforded. Visits ought not, however, to be obtruded officiously; as such unasked civility may give rise to embarrassment, or interfere with that choice on which confidence depends. But, if a distant member of the faculty, whose circumstances are affluent, request attendance, and an honorarium be offered, it should not be declined; for no pecuniary obligation ought to be imposed, which the party receiving it would wish not to incur.

ART. III.—Of the duties of physician as respects vicarious offices.

Section 1. The affairs of life, the pursuit of health, and the various accidents and contingencies to which a medical man is peculiarly exposed, sometimes require him temporarily to withdraw from his duties to his patients, and to request some of his professional brethren to officiate for him. Compliance with this request is an act of courtesy, which should always be performed with the utmost consideration for the interest and character of the family physician, and when exercised for a short period all the pecuniary obligations for such services should be awarded to him. But if a member of the profession neglect his business in quest of pleasure and amusement, he cannot be considered as entitled to the advantages of the frequent and long-continued exercise of this fraternal courtesy without awarding to the physician who officiates the fees arising from the discharge of his professional duties.

In obstetrical and important surgical cases, which give rise to unusual fatigue, anxiety and responsibility, it is just that the fees accruing therefrom should be awarded to the physician who officiates.

ART. IV.—Of the duties of physicians in regard to consultations.

Section 1. A regular medical education furnishes the only presumptive evidence of professional abilities and acquirements, and ought to be the only acknowledged right of an individual to the exercise and honors of his profession. Nevertheless, as in consultations the good of the patient is the sole object in view, and this is often dependent on personal confidence, no intelligent regular practitioner, who has a license to practice from some medical board of known and acknowledged respectability, recognized by the Association, and who is in good moral and professional standing in the place in which he resides, should be fastidiously excluded from fellowship, or his aid refused in consultation, when it is requested by the patient. But no one can be considered as a regular practitioner or a fit associate in consultation, whose practice is based on an exclusive dogma, to the rejection of the accumulated experience of the profession, and of the aids actually furnished by anatomy, physiology, pathology and organic chemistry.

Section 2. In consultations, no rivalship or jealousy should be indulged; candor, probity, and all due respect should be exercised toward the physician having charge of the case.

Section 3. In consultation, the attending physician should be the first to propose the necessary questions to the sick; after which the consulting physician should have the opportunity to make such further inquiries of the patient as may be necessary to satisfy him of the true character of the case. Both physicians should then retire to a private place for deliberation; and the one first in attendance should communicate the directions agreed upon to the patient or his friends, as well as any opinions which it may be thought proper to express. But no statement or discussion of it should take place before the patient or his friends, except in the presence

of all the faculty attending, and by their common consent; and no opinions or prognostications should be delivered which are not the result of previous deliberation and concurrence.

Section 4. In consultations, the physician in attendance should deliver his opinion first; and when there are several consulting, they should deliver their opinions in the order in which they have been called. No decision, however, should restrain the attending physician from making such variations in the mode of treatment as any subsequent unexpected change in the character of the case may demand. But such variation, and the reasons for it, ought to be carefully detailed at the next meeting in consultation. The same privilege belongs also to the consulting physician if he is sent for in an emergency, when the regular attendant is out of the way, and similar explanations must be made by him at the next consultation.

Section 5. The utmost punctuality should be observed in the visits of physicians when they are to hold consultations together, and this is generally practicable, for society has been considerate enough to allow the plea of a professional engagement to take precedence of all others, and to be an ample reason for the relinquishment of any present occupation. But as professional engagements may sometimes interfere, and delay one of the parties, the physician who first arrives should wait for his associate a reasonable period, after which the consultation should be considered as postponed to a new appointment. If it be the attending physician who is present, he will, of course, see the patient and prescribe; but if it be the consulting one, he should retire, except in case of emergency, or when he has been called from a considerable distance, in which latter case he may examine the patient, and give his opinion in writing and under seal, to be delivered to his associate.

Section 6. In consultations, theoretical discussions should be avoided, as occasioning perplexity and loss of time. For there may be much diversity of opinion concerning speculative points, with perfect agreement in those modes of

practice which are founded, not on hypothesis, but on experience and observation.

Section 7. All discussions in consultation should be held as secret and confidential. Neither by words nor manner should any of the parties to a consultation assert or insinuate that any part of the treatment pursued did not receive his assent. The responsibility must be equally divided between the medical attendants—they must equally share the credit of success as well as the blame of failure.

Section 8. Should an irreconcilable diversity of opinion occur when several physicians are called upon to consult together, the opinion of the majority should be considered as decisive; but if the numbers be equal on each side, then the decision should rest with the attending physician. It may, moreover, sometimes happen that two physicians cannot agree in their views of the nature of a case, and the treatment to be pursued. This is a circumstance much to be deplored, and should always be avoided, if possible, by mutual concessions, as far as they can be justified by a conscientious regard for the dictates of judgment. But in the event of its occurrence, a third physician should, if practicable, be called to act as umpire; and, if circumstances prevent the adoption of this course, it must be left to the patient to select the physician in which he is most willing to confide. But, as every physician relies upon the rectitude of his judgment, he should, when left in the minority, politely and consistently retire from any further deliberation in the consultation, or participation in the management of the case.

Section 9. As circumstances sometimes occur to render a special consultation desirable, when the continued attendance of two physicians might be objectionable to the patient, the member of the faculty whose assistance is required in such cases should sedulously guard against all future unsolicited attendance. As such consultations require an extraordinary portion of both time and attention, at least a double honorarium may be reasonably expected.

Section 10. A physician who is called upon to consult, should observe the most honorable and scrupulous regard for the character and standing of the practitioner in attendance;

the practice of the latter, if necessary, should be justified as far as it can be, consistently with a conscientious regard for truth, and no hint or insinuation should be thrown out which could impair the confidence reposed in him, or affect his reputation. The consulting physician should also carefully refrain from any of those extraordinary attentions or assiduities which are too often practiced by the dishonest for the base purpose of gaining applause, or ingratiating themselves into the favor of families and individuals.

ART. V.—Duties of physicians in cases of interference.

Section 1. Medicine is a liberal profession, and those admitted to its ranks should found their expectations of practice upon the extent of their qualifications, not on intrigue or artifice.

Section 2. A physician, in his intercourse with a patient under the care of another practitioner, should observe the strictest caution and reserve. No meddling inquiries should be made—no disingenuous hints given relative to the nature and treatment of his disorder; nor any course of conduct pursued that may directly or indirectly tend to diminish the trust reposed in the physician employed.

Section 3. The same circumspection and reserve should be observed when, from motives of business or friendship, a physician is prompted to visit an individual who is under the direction of another practitioner. Indeed, such visits should be avoided, except under peculiar circumstances; and when they are made, no particular inquiries should be instituted relative to the nature of the disease, or the remedies employed, but the topics of conversation should be as foreign to the case as circumstances will admit.

Section 4. A physician ought not take charge of or prescribe for a patient who has recently been under the care of another member of the faculty in the same illness, except in cases of sudden emergency, or in consultation with the physician previously in attendance, or when the latter has relinquished the case, or has been regularly notified that his services are no longer desired. Under such circumstances, no unjust and illiberal insinuations should be thrown out in relation to the conduct or practice previously pursued, which

should be justified as far as candor and regard for truth and probity will permit; for it often happens that patients become dissatisfied when they do not experience immediate relief, and, as many diseases are naturally protracted, the want of success, in the first stage of treatment, affords no evidence of a lack of professional knowledge and skill.

Section 5. When a physician is called to an urgent case, because the family attendant is not at hand, he ought, unless his assistance in consultation be desired, to resign the care of the patient to the latter immediately on his arrival.

Section 6. It often happens in case of sudden illness, or of recent accidents and injuries, owing to the alarm and anxiety of friends, that a number of physicians are simultaneously sent for. Under these circumstances, courtesy should assign the patient to the first who arrives, who should select from those present any additional assistance that he may deem necessary. In all such cases, however, the practitioner who officiates should request the family physician, if there be one, to be called, and, unless his further attendance be requested, should resign the case to the latter on his arrival.

Section 7. When a physician is called to the patient of another practitioner, in consequence of the sickness or absence of the latter, he ought, on the return or recovery of the regular attendant and with the consent of the patient, to surrender the case.

[The expression, "patient of another practitioner," is understood to mean a patient who may have been under the charge of another practitioner at the time of the attack of sickness, or departure from home of the latter, or who may have called for his attendance during his absence or sickness, or in any other manner given it to be understood that he regarded the said physician as his regular medical attendant.]

Section 8. A physician, when visiting a sick person in the country, may be desired to see a neighboring patient who is under the regular direction of another physician, in consequence of some sudden change or aggravation of symptoms. The conduct to be pursued on such an occasion is to give advice adapted to present circumstances; to interfere no

further than is absolutely necessary with the general plan of treatment; to assume no future direction unless it is expressly desired; and, in this last case, to request an immediate consultation with the practitioner previously employed.

Section 9. A wealthy physician should not give advice gratis to the affluent; because his doing so is an injury to his professional brethren. The office of a physician can never be supported as an exclusively beneficent one; and it is defrauding, in some degree, the common funds for its support, when fees are dispensed with which might justly be claimed.

Section 10. When a physician who has been engaged to attend a case of midwifery is absent, and another is sent for, if delivery is accomplished during the attendance of the latter, he is entitled to the fee, but should resign the patient to the practitioner first engaged.

ART. VI.—Of differences between physicians.

Section 1. Diversity of opinion and opposition of interest may, in the medical as in other professions, sometimes occasion controversy and even contention. Whenever such cases unfortunately occur, and cannot be immediately terminated, they should be referred to the arbitration of a sufficient number of physicians or a court-medical.

Section 2. As peculiar reserve must be maintained by physicians toward the public, in regard to professional matters, and as there exist numerous points in medical ethics and etiquette through which the feelings of medical men may be painfully assailed in their intercourse with each other, and which cannot be understood or appreciated by general society, neither the subject-matter of such differences nor the adjudication of the arbitrators should be made public, as publicity in a case of this nature may be personally injurious to the individuals concerned, and can hardly fail to bring discredit on the faculty.

ART. VII.—Of pecuniary acknowledgments.

Some general rules should be adopted by the faculty, in every town or district, relative to pecuniary acknowledgements from their patients; and it should be deemed a point of honor to adhere to these rules with as much uniformity as varying circumstances will admit.

OF THE DUTIES OF THE PROFESSION TO THE PUBLIC, AND OF THE OBLIGATIONS OF THE PUBLIC TO THE PROFESSION.

ART. I.—Duties of the profession to the public.

Section 1. As good citizens, it is the duty of physicians to be ever vigilant for the welfare of the community, and to bear their part in sustaining its institutions and burdens; they should also be ever ready to give counsel to the public in relation to matters especially appertaining to their profession, as on subjects of medical police, public hygiene, and legal medicine. It is their province to enlighten the public in regard to quarantine regulations; the location, arrangement, and dietaries of hospitals, asylums, schools, prisons, and similar institutions; in relation to the medical police of towns, as drainage, ventilation, etc.; and in regard to measures for the prevention of epidemic and contagious diseases; and when pestilence prevails, it is their duty to face the danger, and to continue their labors for the alleviation of the suffering, even at the jeopardy of their own lives.

Section 2. Medical men should also be always ready, when called on by the legally constituted authorities, to enlighten coroners' inquests and courts of justice on subjects strictly medical—such as involve questions relating to sanity, legitimacy, murder by poisons or other violent means, and in regard to the various other subjects embraced in the science of Medical Jurisprudence. But in these cases, and especially where they are required to make a post-mortem examination, it is just, in consequence of the time, labor, and skill required, and the responsibility and risk they incur, that the public should award them a proper honorarium.

Section 3. There is no profession by the members of which elemosynary services are more liberally dispensed than the medical, but justice requires that some limits should be placed on the performance of such good offices. Poverty, professional brotherhood, and certain of the public duties referred to in the first section of this article, should always be recognized as presenting valid claims for gratuitous services; but neither institutions endowed by the public or by rich individuals, societies for mutual benefit, for the insurance of

lives or for analogous purposes, nor any profession or occupation, can be admitted to possess such privilege. Nor can it be justly expected of physicians to furnish certificates of inability to serve on juries, to perform militia duty, or to testify to the state of health of persons wishing to insure their lives, obtain pensions, or the like, without a pecuniary acknowledgement. But to individuals in indigent circumstances, such professional services should always be cheerfully and freely accorded.

Section 4. It is the duty of physicians, who are frequent witnesses of the enormities committed by quackery, and the injury to health and even destruction of life caused by the use of quack medicines, to enlighten the public on these subjects, to expose the injuries sustained by the unwary from the devices and pretensions of artful empirics and impostors. Physicians ought to use all the influence which they may possess, as professors in Colleges of Pharmacy, and by exercising their opinion in regard to the shops to which their prescriptions shall be sent, to discourage druggists and apothecaries from vending quack or secret medicines, or from being in any way engaged in their manufacture or sale.

ART. II.—Obligations of the public to physicians.

Section 1. The benefits accruing to the public, directly and indirectly, from the active and unwearied beneficence of the profession, are so numerous and important, that physicians are justly entitled to the utmost consideration and respect from the community. The public ought likewise to entertain a just appreciation of medical qualifications; to make a proper discrimination between true science and the assumptions of ignorance and empiricism; to afford every encouragement and facility for the acquisition of medical education—and no longer allow the statute-books to exhibit the anomaly of exacting knowledge from physicians, under a liability to heavy penalties, and making them obnoxious to punishment for resorting to the only means of obtaining it.

EXPLANATORY DECLARATIONS.

WHEREAS, Persistent misrepresentations have been and still are being made concerning certain provisions of the Code of Ethics of this Association, by which many in the

community, and some even in the ranks of the profession are led to believe those provisions exclude persons from professional recognition simply because of differences of opinions or doctrines; therefore

1. Resolved, That clause first, of Art. IV., in the National Code of Medical Ethics, is not to be interpreted as excluding from professional fellowship, on the ground of differences in doctrine or belief, those who in other respects are entitled to be members of the regular medical profession. Neither is there any other article or clause of the said Code of Ethics that interferes with the exercise of the most perfect liberty of individual opinion and practice.

2. Resolved, That it constitutes a voluntary disconnection or withdrawal from the medical profession proper, to assume a name indicating to the public a sectarian, or exclusive system of practice, or to belong to an association or party antagonistic to the general medical profession.

3. Resolved, That there is no provision in the National Code of Medical Ethics in any wise inconsistent with the broadest dictates of humanity, and that the article of the Code which relates to consultations cannot be correctly interpreted as interdicting, under any circumstances, the rendering of professional services whenever there is a pressing or immediate need of them. On the contrary, to meet the emergencies occasioned by disease or accident, and to give a helping hand to the distressed without unnecessary delay, is a duty fully enjoined on every member of the profession, both by the letter and the spirit of the entire Code.

But no such emergencies or circumstances can make it necessary or proper to enter into formal professional consultations with those who have voluntarily disconnected themselves from the regular medical profession, in the manner indicated by the preceding resolution.

N. S. Davis, of Chicago,
A. Y. P. Garnett, of Washington,
H. F. Campbell, of Augusta, Ga.,
Austin Flint, of New York.
J. B. Murdock, of Pittsburgh.

On motion of Dr. Brodie, the resolutions were unanimously adopted.

On motion of Dr. Keller, it was unanimously agreed that the resolutions be added as an explanatory addendum in all future publications of the Code.

Every intelligent and thoughtful reader will perceive that the foregoing code of ethics is not a mere system of by-laws, but a liberal and just recognition of the nature and objects of the physician's calling; the moral principles that should govern his intercourse with his patients, with his professional brethren, with the community at large; and in return the principles that should influence the conduct of both the patient and the community towards the profession.

It properly assumes that injuries, diseases, pains and death are conditions of distress to which the whole human family are more or less liable, and that as it is the paramount object of both physicians and surgeons to prevent or relieve such distress and to prolong human life, it is their duty to promptly and faithfully bestow their services upon all who ask them, whether rich or poor, so far as their own time and health will permit. It also assumes that inasmuch as "the laborer is worthy of his hire" so the physician is justly entitled to a fair pecuniary compensation for his services from all who are able to pay; while those who are so unfortunate as to be both sick and destitute, should also be treated with all the kindness and faithfulness that their cases require.

On the same liberal and humane principles the code makes it the physician's duty to enlighten the public on topics connected with the public health, and to enlighten the courts on all medico-legal questions involved in the administration of justice.

The two topics that have given rise to nearly all the criticisms and controversies are those relating to advertising and consultations. Concerning the first, the code freely permits each member of the profession to place his name, his title, his residence, office and office hours on his cards and in the newspapers and magazines whenever he chooses to do so. It does, however, prohibit him from resorting "to public advertisements, or private cards, or hand bills, inviting the

attention of individuals affected with particular diseases", etc.; not only because such is the common practice of empirics and public impostors, but also because the indulgence in such practice by reputable physicians would soon fill the newspapers with bombastic and pretentious medical advertisements with no profit to any one except the newspaper publisher whose chief income is from his advertising columns. And it would also make it still more difficult for the young physician to establish himself in practice, because he would have to compete in the advertising line with his older and established competitors when he had no funds to spare for such a purpose.

Concerning consultations, the code enjoins the widest liberality consistent with the honor of the profession and the welfare of the patient. It assumes that in all consultations "the good of the patient is the sole object in view"; and therefore no intelligent, legally authorized practitioner who is in good moral and professional standing, should be excluded from consultation, except those who base their practice on an "exclusive dogma" or theoretical law of cure, to the exclusion of the accumulated experience of the profession, and indicate the same by a sectarian title, as more fully explained in the resolutions adopted by the American Medical Association in 1869, and appended to the preceding copy of the Code of Ethics.

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